United States Department of the Interior

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BUREAU OF LAND MANAGEMENT
Las Cruces District Office
1705 N. Valley Drive
P. O. Box 1420
Las Cruces, New Mexico
88004

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement (DEIS) on the proposed livestock grazing management program for the Southern Rio Grande Planning Area in southwestern New Mexico.

The statement is based on data collected by the Bureau of Land Management, Harbridge House (contractor for social and economic portions) and other sources, including information supplied by and in consultation with Federal, State, and local agencies, as well as universities and private individuals.

The purpose of the statement is to disclose in advance the probable environmental impacts of the Proposed Action and its alternatives, and to assure that these factors are considered along with economic, technical, and other consideration in the decision making process.

We would appreciate receiving your comments on the environmental impacts of the Proposed Action. The comment period will run from May 26 - July 24, 1981. Public hearings will be held in Las Cruces, New Mexico on July 8, 1981 at Branigan Memorial Library, 200 E. Picacho and in Truth or Consequences, New Mexico on July 9, 1981 at the Convention Center, corner of Daniels and McAdoo. Both hearings will begin at 1:30 p.m. Those wanting to testify at the hearings are requested to contact Rena Gutierrez at the BLM EIS Office, Room C-219, Federal Building in Las Cruces, phone (505) 524-3603, prior to July 2, 1981.

Comments received after the 60 day review period will be considered in the subsequent decision process, even though they may be too late for inclusion in the final EIS.

Your comments should be sent to:

Ed Webb, EIS Team Leader
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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
ON
GRAZING MANAGEMENT IN THE SOUTHERN RIO GRANDE PLANNING AREA

Abstract: The Bureau of Land Management proposes to implement a livestock grazing management program for the Southern Rio Grande Planning Area of the Las Cruces District in southwestern New Mexico. The Planning Area includes portions of Dona Ana, Sierra, Luna, Socorro, and Otero Counties. This program would allocate forage to livestock and big game, determine levels of livestock grazing management, identify needed support facilities, outline a general implementation schedule, list the standard operating procedures, and discuss the interrelationships with the other programs in the area. A Proposed Action and four alternatives (No Action, Elimination of Livestock Grazing, Maximization of Livestock Forage Production, and Enhancement of Other Resource Values) are considered. A discussion of the affected environment is briefly summarized, and the environmental consequences which would result from implementation of the proposed action and each alternative are analyzed in this Environmental Impact Statement.

Type of Action: (x) Administrative ( ) Legislative

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Comments have been requested from: See Chapter 4.

Date Filed with EPA: Draft: 27 MAY 1981
Final:

Dates of Comment/Review Period: MAY 26 - JULY 24, 1981

Charles W. Luscher
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SUMMARY

SUMMARY

INTRODUCTION

The Bureau of Land Management (BLM) Las Cruces District proposes to implement a grazing management program on 2,146,034 acres of public land within the Southern Rio Grande Planning Area (SRGPA) of the Las Cruces/Lordsburg and White Sands Resource Areas. (See Map 1-1.) A proposed action and four alternatives have been developed to arrive at an acceptable grazing management plan for the Planning Area.

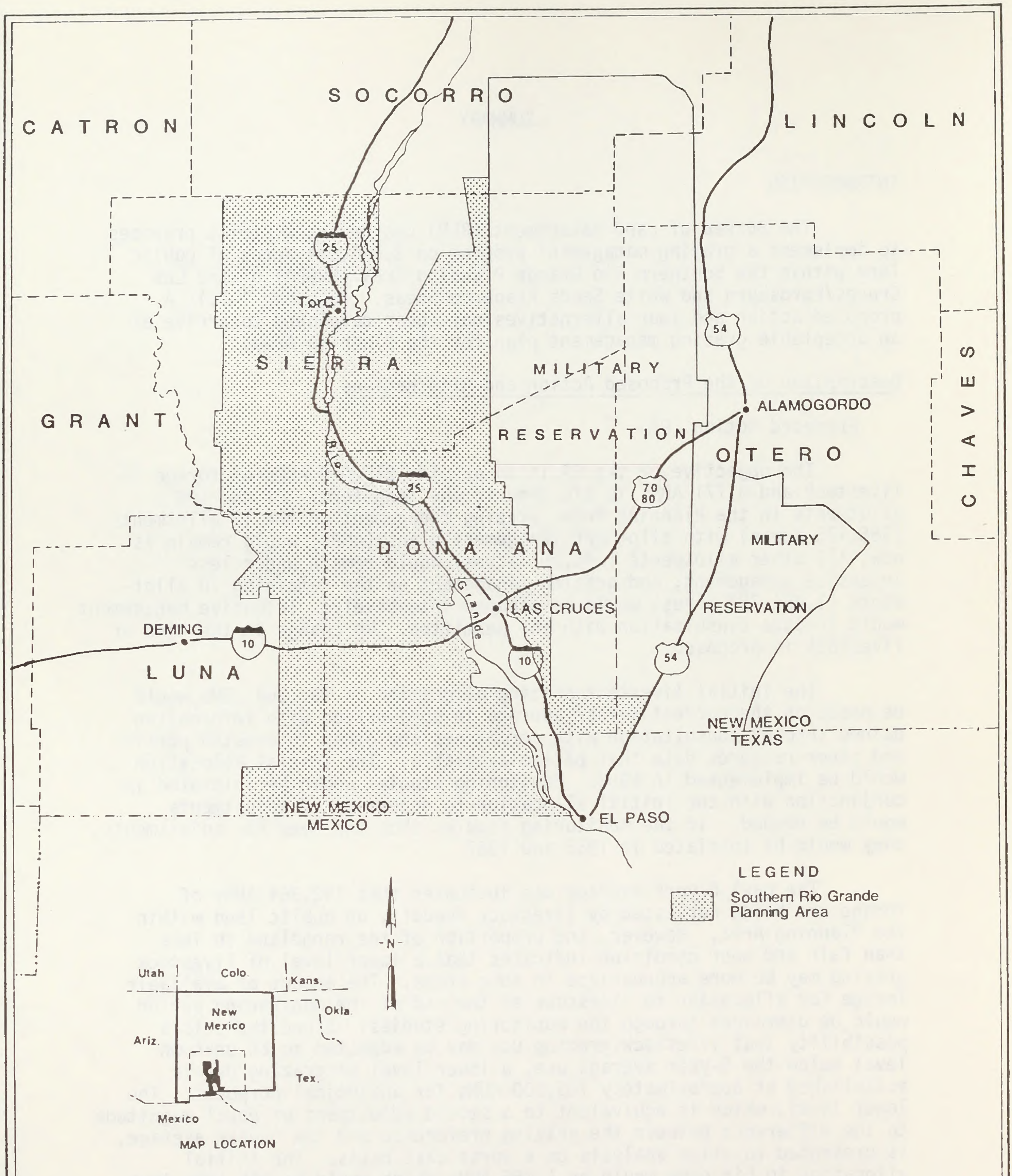
Description of the Proposed Action and Alternatives

Proposed Action (PA)

The objective of the PA is to provide 215,070 AUMs of forage to livestock and 3,771 AUMs to big game in the long-term. Of the 198 allotments in the Planning Area, grazing management on the 13 allotments (365,175 acres) with allotment management plans (AMPs) would remain as now, 115 other allotments (265,655 acres) would remain under less intensive management, and grazing management on the remaining 70 allotments (1,486,772 acres) would be managed intensively. Intensive management would include consultation with the permittee. No change in the kind of livestock is proposed.

The initial livestock grazing allocation of 192,364 AUMs would be based on the current 5-year average in conjunction with information gained through consultation with permittees and other interested parties and other resource data that became available. The initial allocation would be implemented in 1983. Monitoring studies would be initiated in conjunction with the initial allocation to determine if adjustments would be needed. If the monitoring studies show the need for adjustments, they would be initiated in 1985 and 1987.

The past 5-year average use indicates that 192,364 AUMs of forage are being harvested by livestock annually on public land within the Planning Area. However, the proportion of the rangeland in less than fair and poor condition indicates that a lower level of livestock grazing may be more appropriate in some areas. The amount of available forage for allocation to livestock at the end of the monitoring period would be dtermined through the monitoring studies. Since there is a possibility that livestock grazing use may be adjusted to an unknown level below the 5-year average use, a lower level of grazing use is established at approximately 165,500 AUMs for analytical purposes. The lower level, which is equivalent to a second adjustment of equal magnitude to the difference between the grazing preference and the 5-year average, is presented to allow analysis on a worst case basis. The initial allocation to big game would be 1,766 AUMs which would be 955 AUMs less than the 2,271 AUMs presently allocated. This apparent discrepancy is



MAP 1-1

GENERAL LOCATION MAP

SOUTHERN RIO GRANDE PLANNING AREA

SOURCE: New Mexico State Highway Department and BLM Las Cruces Planning Documents due primarily to previous allocations to big game on allotments which have no game or less than one-half deer or pronghorn per section.

Construction of rangeland improvements and vegetation treatments would be required to implement the PA. These would include: 14 dirt tanks, 173 miles of pipeline, 177 drinking troughs, drilling or equipping 40 wells, 7 cattleguards, 34 storage tanks, 1 spring development, and 256 miles of fence. Vegetation treatment would include chemical treatment of 29,772 acres of mesquite and 9,705 acres of creosote, and mechanical treatment of 600 acres of cholla.

Monitoring studies to determine the effects of the livestock allocations, rangeland improvements, and vegetation treatments on plant composition, vigor, and ground cover would be continued. At a minimum, the monitoring studies would be designed to collect data on actual livestock use, degree of key species utilization, climatic conditions, and rangeland ecological condition and trend.

No Action (NA) Alternative

Under the NA Alternative, forage allocation to livestock would remain at 223,617 AUMs, although it is not anticipated that the 5-year average use of 192,364 would be exceeded. Forage allocation to wildlife would be 2,721 AUMs.

Only the exisiting 13 AMP allotments would be managed intensively and monitored. No new rangeland improvements or vegetation treatments would be implemented in direct support of the grazing program, except that Rangeland Improvement Funds (8100) and operator-built rangeland improvements would continue as at present.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, grazing on 2,146,034 acres of public land would be discontinued and 223,617 AUMs of grazing preference would be cancelled. No new grazing systems would be implemented, and those AMPs now implemented would be cancelled.

No rangeland improvements or treatments would be implemented or maintained unless needed for other BLM activities, such as wildlife and watershed. Rangeland improvements that serve no useful purpose would be removed from public land.

Maximization of Livestock Forage Production (MLFP) Alternative

The MLFP Alternative would initiate an intensive program of rangeland management techniques designed to achieve maximum forage production for livestock. Vegetation treatments would consist of chemical treatment of 391,318 acres of mesquite and 381,203 acres of creosote, and mechanical treatment of 12,318 acres of creosote, 11,765 acres of tarbush, and 600 acres of cholla.

Rangeland improvements would consist of 250 miles of pipeline, 354 new waters (including storage tanks, water troughs, and dirt tanks), 116 wells, 277 miles of fence, and 203 soil erosion structures.

Initial allocations would be 192,364 AUMs for livestock and 1,766 for wildlife. However, under the worst case situation (after monitoring) the allocation would be 165,500 AUMs for livestock and 1,766 AUMs for wildlife. Long-term allocations would be 305,609 AUMs for livestock and 1,766 AUMs for wildlife. This would be a decrease of 14 and 26 percent from the 5-year average licensed use and preference respectively in the short-term, and a 38 and 27 percent increase over the 5-year average licensed use and preference respectively in the long-term.

Under the MLFP Alternative, intensive grazing management would be implemented on 90 allotments (1,577,530 acres) , less intensive management on 95 allotments (174,987 acres), and present management on the 13 AMP allotments (365,175 acres).

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, livestock grazing would be reduced 50 percent from the PA on 1,438,784 acres in poor rangeland ecological condition, 25 percent on 644,409 acres in fair condition, and eliminated on 14,456 acres of riparian habitat and 14,629 acres of watershed in critical or severe erosion classes.

Initial forage allocation would be 192,364 AUMs for livestock and 1,766 AUMs for wildlife. However, under the worst case situation (after monitoring) the allocation would be 102,610 AUMs for livestock and 1,766 AUMs for wildlife. This would be a decrease of 47 and 54 percent from the 5-year average licensed use and preference respectively in the short-term. Rangeland improvements, vegetation treatments, and intensive management would be the same as under the PA. It is anticipated that by the year 2010, the forage allocation for livestock and wildlife would be 214,360 AUMs and 3,771 AUMs, respectively. This would be an increase of 10 percent over the 5-year average licensed use and a decrease of 4 percent from preference in the long-term.

Environmental Consequences of the Proposed Action and Alternatives

Site-specific Environmental Assessments (EAs) and Standard Operating Procedures would mitigate the impacts on Visual Resources, and no actions will be taken that would impair the wilderness values in designated Wilderness Study Areas. Therefore, they will not be discussed in this section.

Proposed Action (PA)

Vegetation would be permanently lost from 114 acres that would be occupied by proposed rangeland improvements.

Rangeland in poor ecological condition would decrease by 523,450 acres, and rangeland in fair and good condition would increase by 353,987 and 169,463 acres respectively. Rangeland in poor forage value class would decrease by 257,583 acres and on those in fair and good condition would increase by 180,375 and 77,207 acres respectively.

Average production of desirable and intermediate forage species would increase 151; 145; and 133 pounds per acre on grass, brush, and pinyon-juniper type vegetation respectively. Average percent of the total cover comprised of desirable and intermediate forage species would increase 21; 17; and 14 percent on grass, brush, and pinyon-juniper type vegetation respectively.

Chemical treatment on 29,772 acres of mesquite and 9,705 acres of creosote would reduce these species an average of 40 percent. Production and composition of desirable and intermediate forage species would increase two to three times in these areas.

Soils would be disturbed on 734 acres in short-term and 114 in the long-term.

Sediment yield would be reduced as much as 13 percent on some range sites. However, this would vary from range site to range site.

In the short-term soil erosion by wind would increase on 29,772 acres where chemical treatment of mesquite is implemented. In the long-term wind erosion would be less than existing because of increased cover.

The quantity of forage for big game would be adequate for optimum populations in both the short-term and long-term. Analysis of shrub production data indicates that improvement in ecological condition would result in a lower production in deer browse. Habitat diversity and wildlife species diversity would increase in the long-term in most Standard Habitat Sites. Proposed rangeland improvements would generally benefit wildlife. Unless a riparian grazing treatment is adopted, habitat for riparian-associated threatened or endangered species would decline in the long-term. Threatened or endangered species not associated with riparian habitats would be provided with some habitat improvement.

Under the worst case situation, livestock stocking would be reduced approximately 14 percent from 5-year average licensed use and 26 percent from preference in the short-term, and increase approximately 12 percent over 5-year average and decrease 4 percent from preference in the long-term.

Intensive grazing management would be implemented on 70 allotments comprised of 1,486,772 acres, while less intensive grazing management would be continued on 115 allotments comprised of 265,655 acres. Grazing management on the existing 13 allotments under AMPs would be the same as at present, 365,175 acres.

Runoff would be decreased as much as 6 percent depending on soil type, vegetative type, ground cover, and slope within the watersheds.

No significant changes in runoff rates would be expected as the result of construction of rangeland improvements or vegetation treatments.

Water consumption by livestock and big game would increase 11 percent from the existing situation in the long-term.

Impacts on air quality from the various rangeland improvements and vegetation treatments would be minimal, localized, and of short duration.

The decrease in the number of livestock from 192,364 to 165,500 AUMs (worst case) in the short-term would decrease the impacts of trampling outside of livestock concentration areas. In the long-term, trampling would increase. Based on the number of acres per cultural site, the number of acres disturbed by construction of rangeland improvements, and the number of acres disturbed by heavy trampling around livestock water, 64 sites would be expected to be affected by the PA. Class III inventories prior to construction and Section 106 compliance procedures would mitigate most of the impacts.

Fences constructed in intensive recreation use areas would hinder off-road vehicle use (ORV) access.

Increased deer hunting pressure attributable to the PA would amount to 6,243 visitor days, an increase of 3,456 over the present level. Pronghorn hunting pressure would be expected to remain the same at 59 visitor days.

The PA or alternatives would not affect non-hunting visitor days. However, non-hunting visitor days would be expected to increase as the human population increases.

Under initial allocation, no change in livestock sales would occur. However, under the worst case at the end of the monitoring period, livestock sales would increase by about $800,000 due to reduction in animals, then drop in the next four years by as much as $990,000 below 1976-1980 averages annually. By 2010, sales would be expected to increase above 1976-1980 average levels. A short-term drop of $505,000 in net cash income to ranches is projected, with a long-term gain of over $200,000. Market values of livestock ranches would initially drop by about $2.5 million, with further reductions of another $2.5 million with full implementation of grazing level adjustments. In the long-term, the economic position of affected ranches would, in most cases, be slightly improved.

No Action (NA) Alternative

Rangeland in poor ecological condition would increase by 233,690 acres and rangeland in fair and good condition would decrease by 218,553 and 15,137 acres respectively. Rangeland in poor forage value class would increase by 64,191 acres and decrease by 47,763 and 16,828 acres on those in fair and good condition respectively.

Average production of desirable and intermediate forage species would decrease 17; 8; and 20 pounds per acre on grass, brush, and pinyon-juniper type vegetation respectively. Average percent of the total cover comprised of desirable and intermediate forage species would decrease 3; 1; and 2 percent on grass, brush, and pinyon-juniper type vegetation.

Impacts on threatened or endangered plant species would not change measurably from the existing situation.

Areas would continue to deteriorate where the soil resource is deteriorating and would continue to improve where the soil resource is improving (assuming no major change in climate, stocking rates, construction activities, etc.).

Areas of gravelly sand, gravelly, hills, breaks, and gravelly loam range sites would continue to have the highest estimated sediment yields per unit area, whereas the bottomland, salt flats, and sandy range sites would continue to have the lowest sediment yields per unit area.

Soil series making up the sandy, deep sand, and shallow sandy range sites would continue to be most susceptible to wind erosion.

Big game populations, except for pronghorn reintroductions, would not increase beyond present numbers. Habitat and wildlife species diversity would decline because of increasing brush invasions. Habitat for threatened or endangered animal species would decline because of decreasing diversity. Wildlife benefits would not occur from new livestock water developments.

Although the grazing preference of 223,617 AUMs would not change, actual grazing use probably would be approximately the same as the past 5-year average licensed use of 192,364 AUMs.

No significant changes in surface or ground water resources would occur under this alternative. Livestock and big game would continue to consume 214 acre-feet of water per year.

Impacts on air quality would be the same as at present.

No rangeland improvements are proposed under this alternative, except those which are proposed and would be completed on existing AMPs. It is predicted that two cultural sites would be impacted under this alternative. Class III inventories and Section 106 compliance procedures would be implemented as under the PA.

Demand for recreational activities would continue to increase in proportion to population growth.

Deer hunting visitor days would be expected to remain the same as existing levels of 2,787.

Present social and economic conditions would continue largely unchanged, both in the region generally and among the ranching population.

Elimination of Livestock Grazing (ELG) Alternative

Rangeland in poor ecological condition would decrease by 814,171 acres and rangeland in fair and good condition would increase by 533,602 and 280,569 acres respectively. Rangeland in poor forage value class would decrease by 500,343 acres and increase for fair and good by 369,162 and 131,181 respectively.

Average production of desirable and intermediate forage species would increase by 223; 193; and 211 pounds per acre on grass, brush, and pinyon-juniper type vegetation respectively. Average percent of the total cover comprised of desirable and intermediate forage speices would increase 30; 25; and 23 percent on grass, brush, and pinyon-juniper type vegetation respectively.

Sediment yields would decrease as much as 39 percent on some range sites in the long-term. However, this would vary from range site to range site.

Deer populations would be provided with sufficient forage to increase beyond the multiple use optimum of 3,223. Pronghorn populations would increase slightly, from the present 385 to 480 animals, including the reintroductions. Production of big game forage would have an opportunity to increase. Habitat diversity and wildlife species diversity would increase. Habitat conditions would improve for threatened or endangered species.

Many permittees would be forced out of the livestock business under this alternative because they rely to a great extent on the public land within their allotments for their livestock operations.

Surface runoff would be decreased by as much as 17 percent on some range sites where vegetative cover would increase over 6 percent. Runoff would not decrease on watersheds with desert shrub vegetation because lesser amounts of increased cover would occur. Runoff would not be affected on sandy, deep sand, shallow sandy, or clayey sites because of nearly level slopes or rapid infiltration rates.

The consumption of 213 acre-feet of water by livestock would be eliminated. Big game would consume 4 acre-feet of water.

No impacts on air quality would occur from the construction of rangeland improvements, vegetation treatments, or livestock eliminated from public land.

The impact of trampling by livestock on public land would be eliminated.

Recreation opportunities would increase through the removal of cattle and rangeland improvements, particularly fences from public land.

Deer hunting visitor days would increase to approximately 13,216 from the present 2,787.

Significant social and economic impacts would be experienced by the ranch community. Forty-nine ranches would be forced to close. Approximately 75 persons employed on these ranches would lose their jobs. Ranch income would drop by about $2.7 million with a greater than 60 percent decrease in livestock sales. Only some ranch operators in the large size categories would remain in rangeland livestock business following elimination of grazing on public land.

Maximization of Livestock Forage Production (MLFP) Alternative

Vegetation would be permanently lost on 162 acres that would be occupied by proposed rangeland improvements.

Chemical treatments on 381,203 acres of mesquite and 391,218 acres of creosote would reduce these species an average of 40 percent.

Average production of desirable and intermediate forage species would increase 548 pounds per acre, and average percent of the total cover comprised of desirable and intermediate species would increase 28 percent.

Mechanical treatment and seeding on 12,318 acres of creosote and 11,765 acres of tarbush would increase the average production of desirable and intermediate forage species by 944 pounds per acre. Seeded species would comprise 84 percent of the vegetative cover.

Areas where threatened or engangered plants occur would be identified and avoided where adverse impacts would occur from rangeland improvements or vegetation treatments.

The construction of rangeland improvements would disturb soils on 1,067 acres in the short-term and 163 acres in the long-term.

In the short-term, wind erosion would increase on 391,318 acres because of vegetation treatment on mesquite. In the long-term it would be less than at present because of increased ground cover.

No significant long-term changes in sediment yields would be expected from the creosote vegetation treatment areas.

Sediment yield would be decreased as much as 13 percent on some range sites, but on others no change would be expected.

Deer populations would be provided sufficient forage to reach optimum numbers in both the short-term and long-term. Pronghorn populations would reach optimum numbers because of extensive proposed brush treatment.

Production of desirable and intermediate shrub species would decline. Wildlife habitat and wildlife species diversity would increase. Unless a riparian grazing treatment is adopted, habitat for riparian-associated threatened or endangered species would decline in the long-term. Threatened or endangered species associated with grassland would be benefited in the long-term by the proposed brush treatment.

Under the worst case, livestock stocking would be reduced approximately 14 percent from 5-year average licensed use and 26 percent form preference in the short-term, and increase approximately 37 percent over the 5-year average and 27 percent from preference in the long-term.

An additional 20 allotments comprised of 90,758 acres would be managed intensively. The total acres proposed for intensive management and less intensive management would be 1,577,530 and 174,897 acres respectively. The 13 allotments, comprised of 365,175 acres, presently under AMPs would be managed as now.

No significant decrease in runoff would be expected in the long-term.

Water consumption by livestock and big game would increase about 37 percent in the long-term.

There would be a higher concentration of air pollutants under this alternative than any other alternative because of the greater number of proposed rangeland improvements and acres of vegetation treatments. However, this would be localized and of short duration. In the long-term air quality would improve as the result of increased ground cover.

It is predicted that 237 cultural sites would be impacted because of the increase in the number of rangeland improvements and vegetation treatments. Impacts would be mitigated by Class III surveys and Section 106 compliance procedures.

The increase of livestock numbers and rangeland improvements would increase the conflicts between recreationists and livestock.

ORV access would be restricted in areas where vegetation treatments are applied.

Deer hunting recreation days would increase to 6,243 from the present 2,787. Pronghorn hunting visitor days attributable to public land would increase to 224 from the present 59.

Short-term social and economic impacts would be similar to those of the PA. In the long-term, benefits to the ranching population would be much greater than under the PA. Livestock sales would increase from 1976-1980 levels by $1.5 million, and net cash income would increase by nearly $1 million. Market values of livestock ranches would increase by almost $7 million in the long-term.

Enhancement of Other Resource Values (EORV) Alternative

Vegetation would be permanently lost from 132 acres that would be occupied by rangeland improvements.

Rangeland in poor ecological condition would decrease 620,343 acres. Rangeland in fair and good condition would increase 413,879 and 206,464 acres respectively. Rangeland in poor forage value class would decrease by 390,208 acres and increase 295,660 and 94,568 acres on those in fair and good condition respectively.

Average production of desirable and intermediate forage species would increase 187; 168; and 172 pounds per acre on grass, brush, and pinyon-juniper type vegetation respectively. Average percent of the total cover comprised of desirable and intermediate forage species would increase 26; 21; and 18 percent on grass, brush, and pinyon-juniper type vegetation respectively.

Soils would be disturbed on 826 acres in the short-term and 132 acres in the long-term where rangeland improvements are constructed.

Sediment yields would be reduced up to 27 percent depending on the range site. No significant long-term impacts would result from the vegetation treatments.

Sufficient forage would be available for deer populations to reach optimum populations in both the short-term and long-term. Pronghorn populations would not reach optimum because of limited habitat. Habitat diversity and wildlife species diversity would increase in both the short-term and long-term especially in riparian habitats. Production of desirable and intermediate shrub species would decline. Habitat improvements would occur for all threatened or endangered species which have declined because of habitat changes due to livestock grazing. Those threatened or endangered species associated with riparian habitats would benefit from the proposed fencing of the riparian areas.

In the short-term, livestock AUMs would be decreased approximately 47 and 54 percent from the 5-year average and preference respectively, under the worst case situation. In the long-term, they would be increased approximately 10 percent from the 5-year average and decreased 4 percent from preference.

The long-term stocking rate of the PA (215,070 AUMs) would not be reached because of the fencing of 14,456 acres of riparian habitat and 14,629 acres of watershed in critical or severe erosion classes.

Surface runoff would decrease about 10 percent on some range sites. However, this would vary from range site to range site.

Surface runoff would decrease about 10 percent on the protected watersheds in critical and severe erosion condition. No change would be expected from the protected riparian habitat.

Water consumption by livestock and big game would increase about 10 percent in the long-term.

Effects on air quality from the construction of rangeland improvements and vegetation treatments would be minimal, localized, and of short duration.

It is predicted the 67 cultural sites would be impacted by this alternative. Impacts would be mitigated by Class III surveys and Section 106 compliance procedures.

Interaction and conflict between recreationists and livestock would continue under this alternative.

Deer hunting visitor days would increase to approximately 6,243.

Significant worst case short-term reductions in permitted livestock grazing would lead to the closure of 16 ranches, the loss of 121 full-time job equivalents mostly in the agricultural sector, and the decrease in personal income of $3.7 million, including $2.1 million in ranch operators and workers income. Livestock sales would be reduced by more than $3 million. Market values of ranch operations with allotments on public land would drop by about $19 million. Significant ranch consolidation would be likely in the long-term resulting in a reduced ranching population. Increased use of public land for activities other than ranching would be expected to bring the ranching population into greater conflict with other users.

The following table shows the comparison of the impacts of the proposed action and alternatives.

COMPARISON OF IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

	Existing	Proposed Action		No Action Alternative Future Environment		Elimination of Livestock Grazing Alternative		Maximization of Livestock Forage Production Alternative		Enhancement of Other Resource Values Alternative	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Grazing Use (AUMs)	192,364[a]	165,500[b]	215,070	223,617[c]	223,617[c]	0	0	165,500[b]	305,609	102,610[b]	214,360
Physical Setting	stable	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vegetation											
Ecological Condition (acres)											
Good	32,318	NS	201,781	NS	17,181	NS+	312,887	NS	289,801	NS+	238,782
Fair	660,347	NS	1,014,334	NS	441,794	NS+	1,193,949	NS	1,230,195	NS+	1,074,226
Poor	1,453,369	NS	929,919	NS	1,687,059	NS+	639,198	NS	626,038	NS+	833,026
Forage Value (acres)											
Good	280,305	NS	357,512	NS	263,477	NS+	411,486	NS	444,975	NS+	374,873
Fair	668,885	NS	849,260	NS	621,522	NS+	1,038,047	NS	1,038,413	NS+	964,545
Poor	1,196,844	NS	939,262	NS	1,261,035	NS+	696,501	NS	662,646	NS+	806,616
Production (lbs/ac)[d]											
Grass Type	333	NS	484	NS	316	NS+	556	1,109[f]	713[g]	NS+	520
Brush Type	165	NS	310	NS	157	NS+	358			NS+	333
Pinyon-Juniper Type	387	NS	520	NS	367	NS+	598			NS+	559
Composition (percent)[e]											
Grass Type	50	NS	71	NS	47	NS+	80	84[f]	58[g]	NS+	76
Brush Type	30	NS	47	NS	29	NS+	55			NS+	51
Pinyon-Juniper Type	54	NS	68	NS	52	NS+	77				72
Threatened or Endangered (T/E) Plant Species	0	0	0	0	0	+	+	-[f]	-[g]	+	+
Soils											
Sediment Yield (acre-ft/sq mi/yr)	NC	NC	0.80[h]	NC	NC	NC	0.62[h]	NC	0.80[h]	NC	0.75[h]
Wildlife											
AUMs Allocated	2,721	1,766	3,771	2,721	2,721	[i]	[i]	1,766	3,771	1,766	3,771
Pronghorn Population[j]	385	435	450	435	435	435	450	435	1,059	435	450
Deer Population[j]	1,363	1,363	3,223	1,363	1,363	1,363	6,976	1,363	3,223	1,363	3,223
Estimated Overall Change in Standard Habitat Sites	E	E	I	E	0	I	I	E	I	I	I
Production of Desirable and Intermediate Shrub Species	E	E	0	E	E	E	I[k]	E	0	E	0
T/E Animal Species											
Riparian Associated	0	0	-	0	-	+	+	0	-	+	+
Nonriparian Associated	0	0	+	0	-	+	+	0	+	+	+
Livestock Grazing											
Number of Operators	198	198	198	198	198	0	0	198	198	198	198
AUs	18,635	13,792	17,922	18,635	18,635	0	0	13,792	25,467	8,551	17,863
Water Resources											
Water Use (acre-feet/yr)	214	184	240	214	214	2	4	184	340	114	239
Surface Runoff (acres)											
0-9 percent decrease	NC	NC	2,146,034	NC	NC	NC	1,946,401	NC	2,146,034	NC	1,946,401
10-20 percent decrease	NC	NC	0	NC	NC	NC	199,633	NC	0	NC	199,633
Air Quality	stable	local dust increase	NS	NS	NS	dust decrease	dust decrease	local dust increase	NS	NS	dust decrease
Cultural Resources											
Rate of Disturbance from existing	- -	NS	NS	NS	NS	+	+	-	+	+	+
Visual Resources	stable	NS	NS	NC	NC	NS+	NS+	-	NS	NS-	NS-
Wilderness	stable	NS	NS	NS	NS	NS+	NS+	NS	NS	NS	NS
Recreation											
Visitor Days	141,200	NS	NS	NC	NC	NS+	NS+	NS-	mixed±	NS-	NS-
Deer Hunting Visitor Days	2,787	2,787	6,243	2,787	2,787	2,787	13,216	2,787	6,243	2,787	6,243
Pronghorn Hunting Visitor Days	59	59	59	59	59	59	59	59	224	59	59
Economic Conditions											
Number of Ranches	153	153	153	153	153	104	45	153	153	137	100
Livestock Sales (millions $)	7.2	6.2	7.6	7.2	7.2	2.9	2.9	6.8	8.7	4.2	4.2
Net Cash Income (millions $)	3.7	3.2	3.9	3.7	3.7	1.0	1.0	3.5	4.5	1.3	1.3
Big Game Visitor Day Values											
Direct Income Effect	48,382	48,382	107,134	48,382	48,382	48,382	225,675	48,382	109,939	48,382	107,134
Regional Income Effect	69,573	69,573	154,058	69,573	69,573	69,573	324,520	69,573	158,091	69,573	154,058

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes:

a/Preference is 223,617 AUMs but 5-year average licensed use is 192,364.
b/Worst case basis.
c/Shows present preference, but actual use would probably average the same as the 5-year average of 192,364 AUMs.
d/Includes production of desirable and intermediate forage species only. (weighted average all condition classes)
e/Percent of total ground cover comprised of desirable and intermediate forage species (weighted average all condition classes).
f/Mechanical treatment and seedling only, other values same as PA.
g/Chemical treatment only, other values same as PA.
h/Variable depending on range site.
i/All AUMs available to wildlife.
j/Populations for areas with more than .5 animals per section (Map 2-2).
k/Assumes more than 10 points improvement in ecological condition class.

NC: No change from existing (changes not quantifiable)
NS: Not significant
+: Beneficial
-: Adverse
I: Increased value
E: Existing value
0: Decrease value
0: Zero

CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

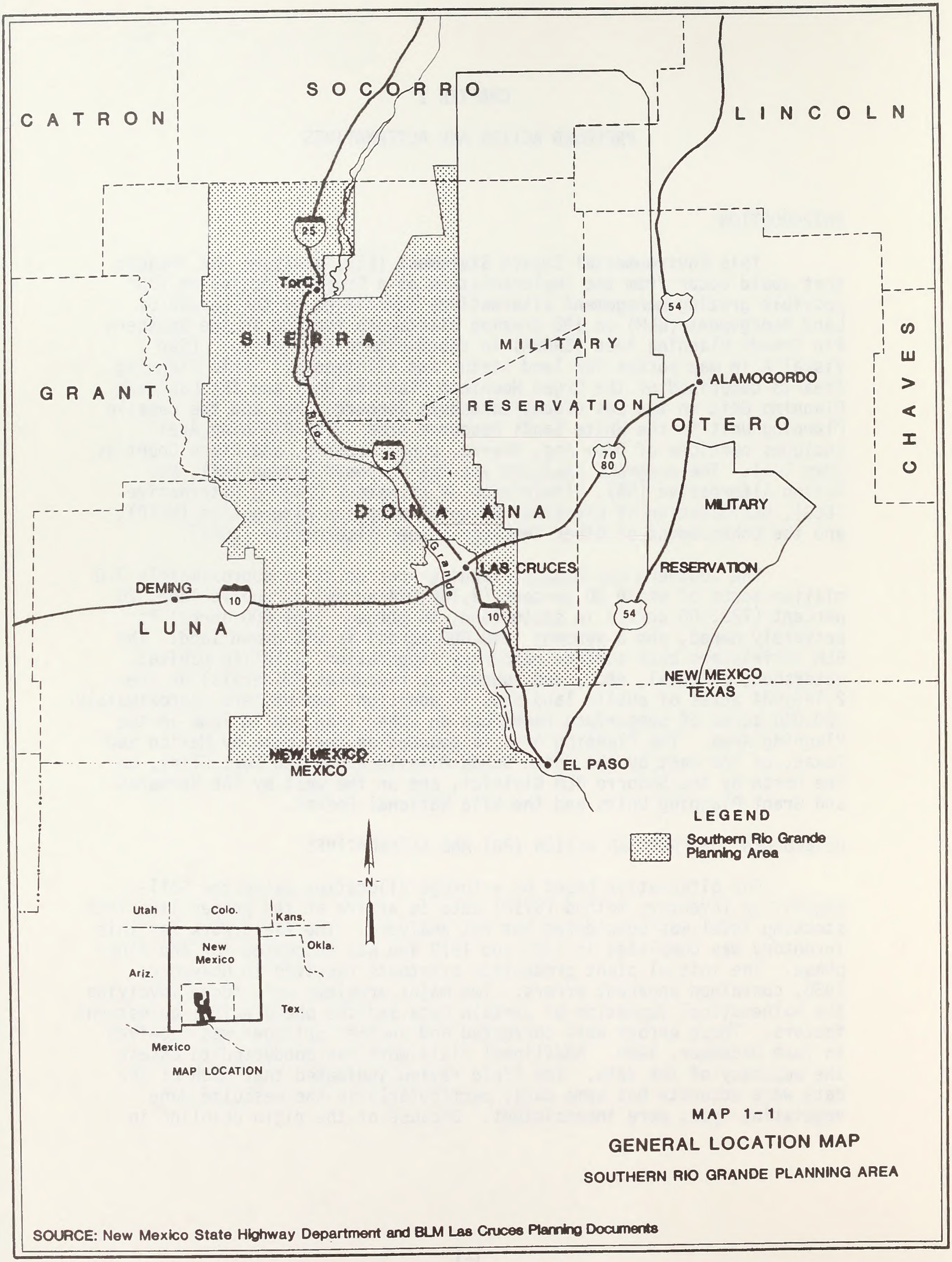
INTRODUCTION

This Environmental Impact Statement (EIS) analyzes the impacts that would occur from the implementation of a Proposed Action or four possible grazing management alternatives identified by the Bureau of Land Management (BLM) on 198 grazing allotments located in the Southern Rio Grande Planning Area (SRGPA) in southwestern New Mexico. (See Visual A in map pocket for land status and allotments.) This Planning Area is comprised of the Organ Mountain Planning Unit and the Las Uvas Planning Unit in the Las Cruces/Lordsburg Resource Area and the Caballo Planning Unit in the White Sands Resource Area. The Planning Area includes portions of Dona Ana, Sierra, Luna, Socorro, and Otero Counties (Map 1-1). The programs analyzed are the Proposed Action (PA), No Action Alternative (NA), Elimination of Livestock Grazing Alternative (ELG), Maximization of Livestock Forage Production Alternative (MLFP), and the Enhancement of Other Resource Values Alternative (EORV).

The Southern Rio Grande Planning Area contains approximately 3.6 million acres of which 60 percent (2,146,034 acres) is public land, 20 percent (723,000 acres) is state land, 16 percent (581,000 acres) is privately owned, and 3 percent (110,000 acres) is withdrawn land. The BLM administers both surface resources (vegetation, wildlife habitat, watershed, cultural, etc.) and subsurface resources (minerals) on the 2,146,034 acres of public land and, in addition, administers approximately 400,000 acres of subsurface resources on other than public land in the Planning Area. The Planning Area is bounded on the south by Mexico and Texas, on the east by the White Sands Missile Range and Fort Bliss, on the north by the Socorro BLM District, and on the west by the Hermanas and Grant Planning Units and the Gila National Forest.

DEVELOPMENT OF PROPOSED ACTION (PA) AND ALTERNATIVES

One alternative based on a forage allocation using the Soil-Vegetation Inventory Method (SVIM) data to arrive at the proper livestock stocking level was considered but not analyzed. The field work for this inventory was completed in 1978 and 1979 and was automated for the final phase. The initial plant production printouts received in November, 1980, contained apparent errors. Two major problems were found involving the mathematical summation of certain data and the phenological adjustment factors. These errors were corrected and another printout was received in late December, 1980. Additional field work was conducted to assess the accuracy of the data. The field review indicated that much of the data were accurate but some data, particularly in the mesquite dune vegetation type, were inconsistent. Because of the rigid deadline in



MAP 1-1

GENERAL LOCATION MAP

SOUTHERN RIO GRANDE PLANNING AREA

SOURCE: New Mexico State Highway Department and BLM Las Cruces Planning Documents filing the EIS by September 1981, it was not possible to resolve these inconsistencies in the data and include this alternative in the EIS.

Although there are some inconsistencies in the SVIM data, it is the best data available. The basic soils and vegetation data appear to be accurate and potential forage production from the range site description is reliable. Therefore, these data will be used in the analysis of impacts on vegetation but not in the allocation of forage. The procedure that would be used to allocate forage is explained in the description of the PA section of this chapter.

PURPOSE OF THE PROPOSED ACTION (PA)

The purpose of the PA is to protect and enhance the soil and vegetation resources of the Planning Area which provide the foundation for watershed, livestock forage, wildlife habitat, recreation and aesthetic values, and social and economic values.

OBJECTIVES

The objectives are: (1) by the year 2010, increase total livestock and big game forage production from 192,364 Animal Unit Months (AUMs) to 215,070 AUMs; (2) manage key deer habitat in the Caballo and Organ Mountains to enhance production of preferred deer forage species; (3) manage key pronghorn habitat in the Jornada Plain to enhance production of preferred pronghorn forage species; (4) protect and manage 131 acres of riparian vegetation on public land along the Rio Grande, the South Fork of Palomas Creek, Berrenda Creek, and on the Corralitos Ranch; (5) improve the rangeland condition on 1,649,690 acres which are in less than good condition, and maintain the condition on 496,344 acres currently classified in good or better condition or which have limited or no potential for improvement; and (6) protect and enhance the habitat for threatened, endangered, or sensitive plant and animal species.

DESCRIPTION OF THE PROPOSED ACTION (PA) AND ALTERNATIVES

Proposed Action (PA)

The BLM proposes to implement a grazing management program designed to improve the condition of the public rangeland in the SRGPA. It includes adjusting the stocking rates on an allotment-by-allotment basis to balance with the current grazing capacities of these allotments. Using the 5-year average licensed use, information gained through consultation with rangeland users and other data which may become available, BLM proposes to establish the following at the end of the 5-year monitoring period:

1. livestock stocking rate;

2. the kind of livestock allowed;

3. the period of use;

4. areas to be excluded from livestock grazing;

5. the allocation of forage to big game species;

6. the maximum level of forage utilization;

7. minimum grazing and rest periods;

8. rangeland improvements and vegetation treatments necessary to properly manage the renewable resources on the Planning Area.

Amount of Vegetation Allocated to Grazing and Other Uses

The normal level of livestock grazing (approximated by a 5-year average of licensed use) along with the present estimated big game populations provides an indication of the amount of forage that is currently being harvested on each allotment. This data, in conjunction with information gained through consultation with permittees and other interested parties and other resource data that becomes available, would be used to determine the initial livestock grazing allocations. The initial allocations would be implemented in 1983. Monitoring studies would be initiated in conjunction with the initial allocations to determine if grazing adjustments would be needed. If the monitoring studies indicate that grazing adjustments are necessary to arrive at the proper grazing capacity, they would be implemented in 1985 and 1987.

The past 5-year average use indicates that 192,364 AUMs of forage are being harvested by livestock annually on public land within the Planning Area. However, the proportion of the rangeland in less than fair and poor condition indicates that a lower level of livestock grazing may be more appropriate in some areas. The amount of available forage for allocation to livestock at the end of the monitoring period would be determined through the monitoring studies. Since there is a possibility that livestock grazing use may be adjusted to an unknown level below the 5-year average use, a lower level of grazing use is established at approximately 165,500 AUMs for analytical purposes. The lower level, which is equivalent to a second adjustment of equal magnitude to the difference between the grazing preference and the 5-year average, is presented to allow analysis on a worst case basis. The initial allocation to big game would be 1,766 AUMs which would be 955 AUMs less than the 2,721 AUMs presently allocated. This apparent discrepancy is due primarily to previous allocations to big game on allotments which have no game or less than one-half deer or pronghorn per section.

It is anticipated that by the year 2010, the projected allocation would be 215,070 AUMs to livestock and 3,771 AUMs to big game. This would represent an increase of 22,706 AUMs over the present 5-year average licensed use and would be a decrease of 8,547 AUMs from the existing preference. The allocation to big game would be an increase of 1,050 AUMs over the existing allocation.

Table 1-1 shows the existing total allotment acreages, livestock AUMs (preference and 5-year average licensed use), big game AUMs, and the initial proposed allocations to livestock and big game. Table 1-2 indicates proposed forage allocations by alternative. Figures 1-1 to 1-5 indicate graphically the forage allocations under the PA and alternatives.

TABLE 1-1

SUMMARY OF EXISTING ALLOTMENT STATUS, ACREAGE, AND AUM ALLOCATIONS

					Present AUMs Allocated					Proposed Forage Allocations			
		Acres											
Existing Allotment Status	No.	Public	Other	Total	Total AUMs (Pvt., State, Fed'l)	Livestock Federal Preference	Controlled AUMs[a]	Livestock Average Licensed Use (Fed'l)	Big Game	Total AUMs (Pvt., State, Fed'l)	Livestock Federal	Controlled AUMs	Big Ga (Fed'l)
AMP	13	365,175	177,718	542,893	69,312	45,078	24,234	39,866	657	61,520	39,866	21,654	178
Non-AMP	185	1,752,427	605,052	2,357,479	254,795	178,539	76,256	152,498	2,064	220,116	152,498	67,618	1,588
Unallotted	9	28,432	4,454	32,866	0	0	0	0	0	0	0	0	0
Total[b]		2,146,034	787,224	2,933,258	324,107	223,617	100,490	192,364	2,721	281,636	192,364	89,272	1,766

Source: BLM Las Cruces District Office Planning Documents, 1980.

Notes: a/Controlled AUMs are those AUMs on private or state lands which are owned or leased by the permittee.
b/Acres of other ownership does not reflect 516,776 acres of private and state lands not included in the vegetation survey. These lands include lands not within allotment boundaries and lands within lease areas.

Method of Grazing Management

Under the PA, livestock grazing would be authorized on all allotments now being grazed. No consolidations (combinations) or divisions of existing allotments are proposed. (Refer to Appendix E-2 for detailed allotment information--acreage, ownership, present preference and licensed use, and proposed AUM allocation and Appendix E-3 for the present and proposed allocations by land ownership.)

There are no wild, free-roaming horses or burros within the Planning Area, therefore, no forage is allocated to them.

There are presently 13 allotments (365,175 acres) with existing Allotment Management Plans (AMPs) approved prior to 1975. Of these, seven are managed under deferred rotation grazing systems and six are managed under rest rotation. Under the PA, the grazing systems and season of use for these allotments would remain unchanged.

PROPOSED FORAGE ALLOCATION BY ALTERNATIVES

	Proposed (1987)			Projected (2010)		
	Livestock AUMs	Big Game AUMs	Total AUMs	Livestock AUMs	Big Game AUMs	Total AUMs
Proposed Action	165,500[a/]	1,766	167,266	215,070	3,771	218,841
No Action	223,617[b/]	2,721	226,338	223,617	2,721	226,338
Elimination of Livestock Grazing	0	[c/]		0	[c/]	
Maximization of Livestock Forage Production	165,500[a/]	1,766	167,266	305,609	4,299	309,908
Enhancement of Other Resource Values	102,610[a/]	1,766	104,376	214,360	3,771	218,131

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes: [a/] Estimated worst case allocation after the monitoring period.

[b/] This figure is preference. Actual stocking would be closer to the 5-year average of 192,364 AUMs.

[c/] All AUMs would be available for big game.

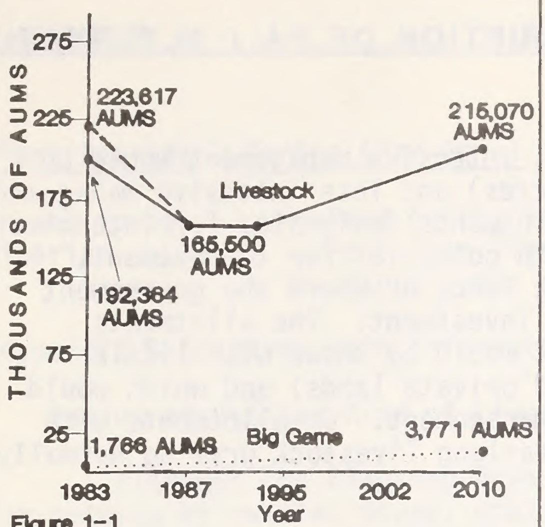


Figure 1-1

Forage Allocation Under Proposed Action

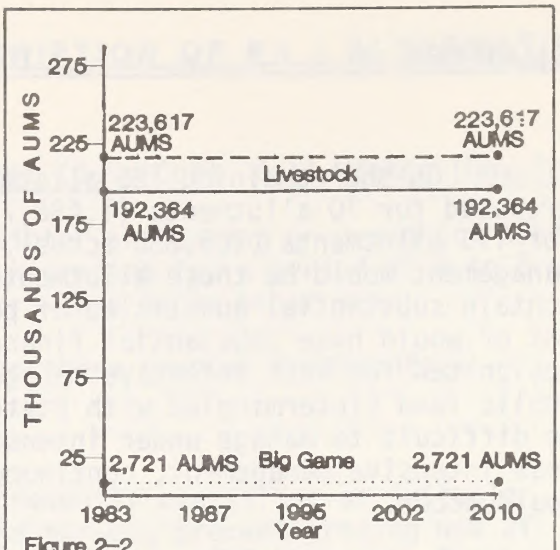


Figure 2-2

Forage Allocation Under No Action Alternative

– – – – Administrative adjustment from preference.

——— Actual adjustment in livestock use from 5-year average licensed use.

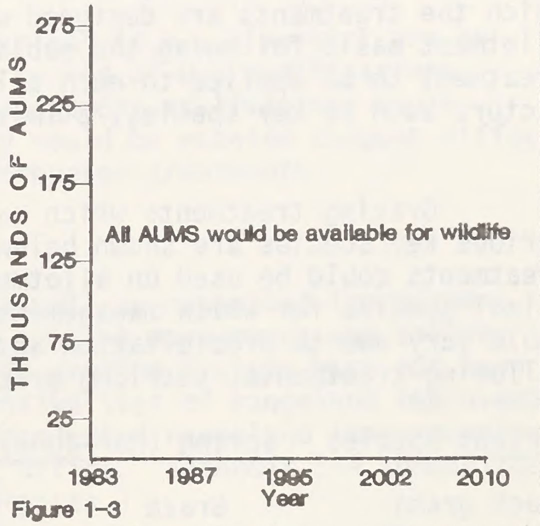


Figure 1-3

Forage Allocation Under Elimination Of Livestock Grazing Alternative

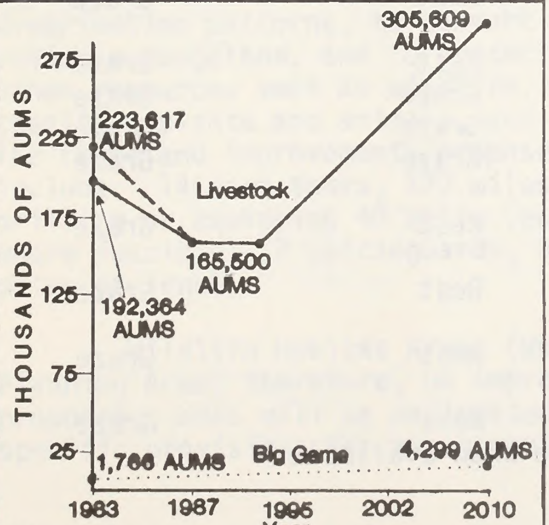


Figure 1-4

Forage Allocation Under Maximization Of Livestock Forage Production Alternative

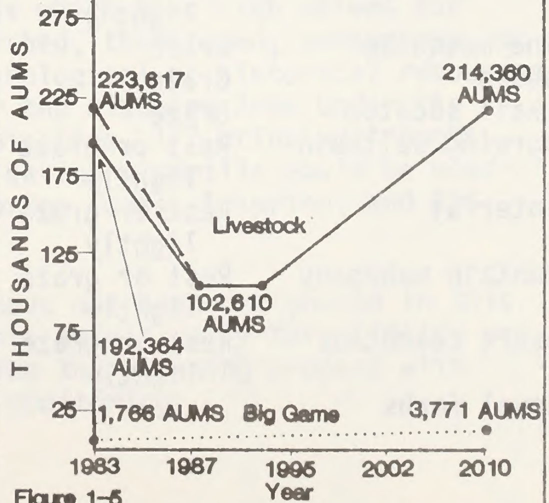


Figure 1-5

Forage Allocation Under Enhancement Of Other Resource Values Alternative

SOURCE: BLM Las Cruces District EIS Team Files , 1980

On the remaining 185 allotments, intensive management would be proposed for 70 allotments (1,486,772 acres) and less intensive management for 115 allotments (265,655 acres). Allotments designated for intensive management would be those allotments with potential for improvement, contain substantial quantities of public land, or where the government has or would have substantial financial investment. The allotments designated for less intensive management would be those with little public land (intermingled with state and private lands) and which would be difficult to manage under intensive management. On allotments with less intensive management, continuous yearlong livestock grazing normally would occur.

Intensive management would incorporate minimum rest periods based on the physiological needs of the key forage species. (See Appendix B-5 for a partial list of the major plant species in the Planning Area.) The specific management treatments and key forage species for which the treatments are designed would be developed on an allotment-by-allotment basis following the publication of the Final EIS. The specific treatment to be applied to each allotment would depend on numerous factors such as key species, climate, improvements needed, topography, etc.

Grazing treatments which have been used in the southwest on various key species are shown below (one or a combination of these treatments could be used on allotments, depending on the plant and animal species for which management is designed). The seasons shown would vary due to precipitation and soil moisture. In addition to the following treatments, yearlong grazing would be considered.

Plant Species	Spring (Mar-June)	Summer (July-Oct)	Fall-Winter (Nov-Feb)
Black grama	Graze	Rest	Graze
Sideoats grama	Graze	Rest	Graze
Blue grama	Graze	Rest	Graze
Mesa dropseed	Graze	Rest	Graze
Bush muhly	Rest or graze lightly	Rest	Graze
Vine mesquite	Graze	Graze	Graze
Tobosa	Graze	Graze	Graze
Alkali sacaton	Graze	Graze	Graze
Fourwing saltbush	Rest or graze lightly	Rest	Graze
Winterfat	Rest or graze lightly	Rest	Graze
Mountain mahogany	Rest or graze lightly	Rest	Graze
Desert ceanothus	Rest or graze lightly	Rest	Graze
Annual forbs		Graze when available	

Plant Species	Spring (Mar-June)	Summer (July-Oct)	Fall-Winter (Nov-Feb)
Annual forbs	Rest during late winter and spring on pronghorn habitat		
Riparian	Rest from livestock grazing for a period of 3 to 5 years, then graze no more than every other year		

(Appendix B-10 gives more information on these grazing treatments.)

Period of Use and Kind of Livestock

Although the Planning Area is presently classified as suitable for grazing by cattle, sheep, goats, and horses, present grazing use of the public land is primarily by cattle and a few saddle horses. Any future requests for changes in kind of livestock would be analyzed through Environmental Assessments (EAs) on an individual basis. Changes of existing kinds of livestock are not proposed.

The present period of use is yearlong (i.e., livestock are on the allotment during the entire year). Period of use modifications would not be proposed under intensive management as livestock would continue to be on the allotment but they would be rotated through different pastures in order to implement the proposed treatments.

Support Facilities

Vegetation treatment projects as well as rangeland improvement projects would be required to implement grazing management and achieve the objectives of the PA. Since specific grazing systems have not been designed for each allotment, a comprehensive list of rangeland improvement projects is not available. (A list of projected rangeland improvements is available in the Las Cruces District Office. Appendix E-4 summarizes these proposed projects for analysis purposes.)

Rangeland improvement projects consisting primarily of fences and water developments would be required to achieve better livestock distribution patterns, to convert potentially suitable rangeland into suitable rangeland, and to protect areas which have high values for other resources such as wildlife, watershed, threatened, endangered, or sensitive plants and animals, and archaeological or historical resources. The rangeland improvements proposed for the Planning Area under the PA include: 14 dirt tanks, 173 miles of pipeline, 177 drinking troughs, drilling or equipping 40 wells (energy saving windmills would be used where feasible), 7 cattleguards, 34 storage tanks, 1 spring, and 256 miles of fence.

Wildlife Habitat Areas (WHAs) have not been designated in this Planning Area; therefore, no improvements specifically for wildlife are proposed. WHAs will be designated during the planning process with specific provisions for management and monitoring.

Stands of brush have invaded the semidesert rangelands of the southwest for the past hundred years. For example, on the Jornada Experimental Range (which lies within the Planning Area) mesquite dominated only 4.8 percent of the vegetation in 1858, but it increased to 50.3 percent in 1963; creosote dominated 0.4 percent in 1858 and 14.2 percent in 1963; and tarbush dominated 0.4 percent in 1858 and 8.6 percent in 1963 (Herbel et al. 1974). Drought, livestock grazing, and rodent activity have contributed to this invasion of brush (Paulsen and Ares 1962 and Herbel, et al. 1974).

Rangelands dominated by mesquite, creosote, or tarbush have little or no potential for improvement through management until the brush is removed (Herbel et al. 1974); therefore, vegetation treatments are proposed for approximately 40,077 acres to decrease the density of these species. Chemical treatment is proposed for 29,772 acres of mesquite and for 9,705 acres of creosote, and mechanical treatment is proposed for 600 acres of cholla. Table 1-3 shows the allotments, acreage, and the anticipated increase in forage production of the proposed vegetative treatments and Map 1-2 shows the location of the treatment areas by species and methods proposed for treatment.

Two herbicides are proposed for use in controlling mesquite and creosote. They are Dowco 290 (3,6-dichloropicolinic acid) and Graslan (tebuthiuron). Dowco 290 is a liquid herbicide and would be mixed with water, while Graslan is a pelletized herbicide. The rate of application by herbicide and vegetation species follows (*AI/Ac - Active ingredient per acre):

Species	Chemical	
	Dowco 290	Graslan
Mesquite	1/2 lb. AI/Ac*	3/4-1 lb. AI/Ac
Creosote	1/4 lb. AI/Ac	1/4-1/3 lb. AI/Ac

Dowco 290 would be used primarily to treat mesquite as it has proved to be effective on mesquite without damaging more palatable vegetation, and Graslan would be used primarily on creosote as it has proved to be effective on creosote at low rates of application.

Only federally registered herbicides approved for use by the Department of the Interior would be used on public land. Graslan has been approved for use in New Mexico and application for approval has been submitted for Dowco 290. If other herbicides effective on mesquite and creosote are approved prior to the proposed vegetation treatment, they would be considered for use.

A site-specific EA would be prepared prior to any vegetation treatment to determine the site-specific impacts. (Refer to Appendix E-6 for the guidelines which would be used in the vegetation treatment program.)

TABLE 1-3

SUMMARY OF PROPOSED VEGETATION TREATMENTS ON PUBLIC LAND
PROPOSED ACTION AND ENHANCEMENT OF OTHER RESOURCE VALUES

Allotment Number	(Acres)[a] Chemical Treatment		(Acres)[a] Mechanical Treatment	Total Acres Treated	Additional AUMs Avail. to Livestock Through Manipulation
	Creosote	Mesquite	Cholla		
3002		4,279		4,279	643
3003		1,600		1,600	252
3036	3,960			3,960	264
3038		16,210		16,210	2,619
3044		3,428		3,428	541
6053	5,745	4,255		10,000	1,667
6102			600	600	0
TOTAL	9,705	29,772	600	40,077	4,618
Estimated Cost Per Acre	$5.00-$10.00	$20.00-$25.00	$20.00		
Estimated Total Cost	$77,640-$97,050	$595,440-$744,300	$12,000		

Source: BLM Las Cruces District Office Planning Documents, 1980.

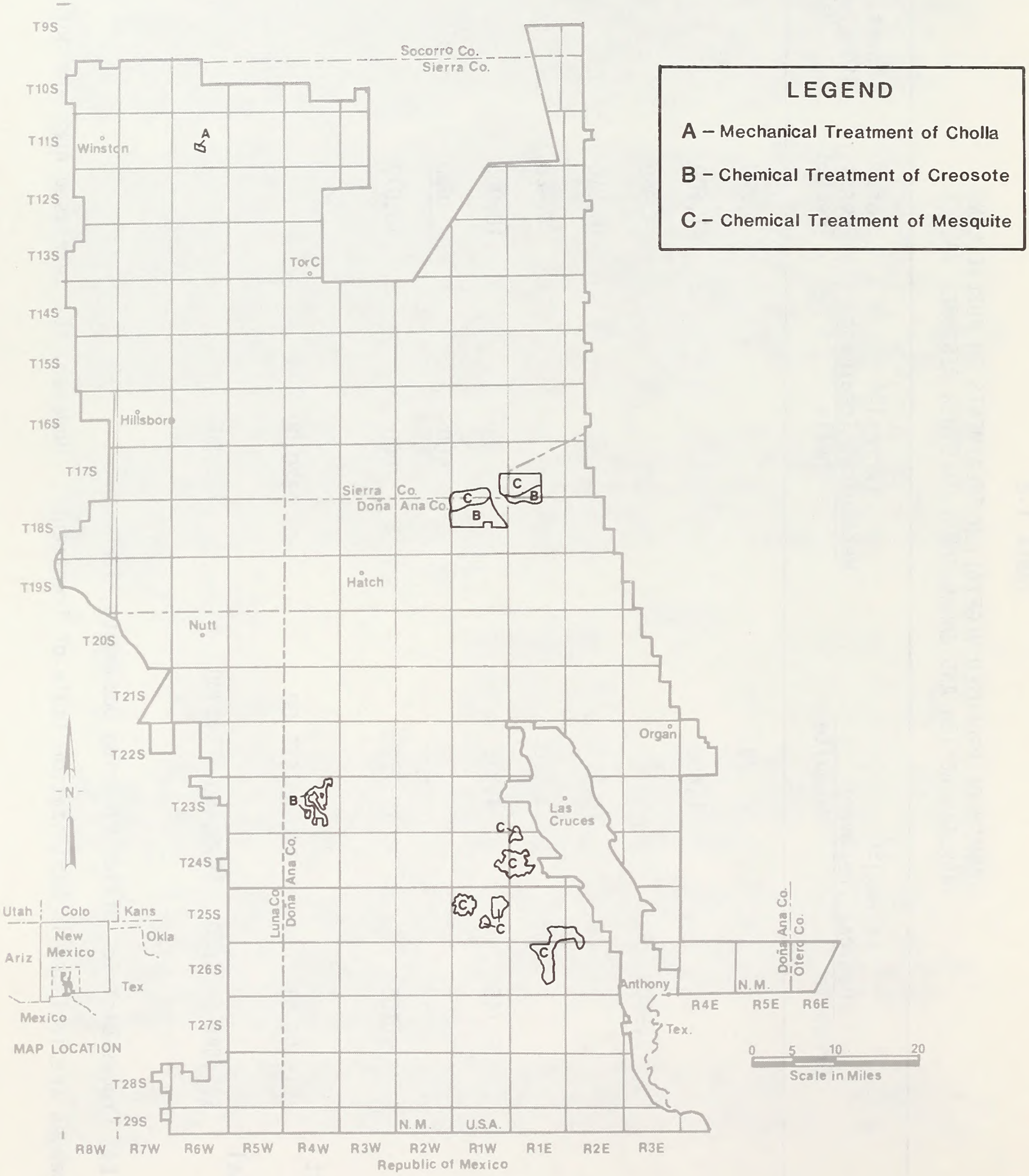
Notes: a/Acreages are included in Maximization Table of Treatments. However, the increased AUMs are not included.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA

VEGETATIVE TREATMENTS

(Proposed Action and Enhancement of Other Resource Values)



SOURCE: BLM Las Cruces District Files 1980

MAP. 1-2

Monitoring, Evaluation and Adjustment of the Proposed Action

Monitoring of the rangeland management program would be necessary to determine the correct livestock grazing capacity, the effectiveness of the grazing treatments, and the effectiveness of the vegetation treatments and other rangeland improvements. During monitoring, permittees and other interested individuals and groups would be contacted and informed of the procedures which would be used in initiating the studies and would be invited to participate in the process.

As a minimum, the monitoring studies would be designed to collect data on actual livestock use, wildlife use, degree of key forage species utilization, climatic conditions, and rangeland ecological condition and trend. Proper forage utilization would vary depending on the key forage species and season of use; however, in no instance would it be more than 60 percent of the current year's growth. The number of allotments to be monitored and the number and frequency of studies per allotment would be determined primarily by BLM's budgetary constraints or limitations. The following is a list of situations, by priority, in which allotments would be placed to determine the extent of the monitoring program:

1. Continuing or updating existing allotment management plan (AMP) studies;
2. allotments with significant resource problems and grazing use adjustments are likely to be needed;
3. allotments with minimal or no resource problems but where actual use data is inadequate;
4. allotments proposed for intensive management;
5. allotments proposed for less intensive management.

Wildlife habitat monitoring would also be determined by budgetary constraints or limitations. The following is a list of situations, by priority in which habitats would be monitored.

1. Threatened or endangered species habitats with management problems;
2. big game habitats under management plans;
3. other habitats.

The detailed techniques to be used in the studies would vary depending on the data needed. The following techniques or variation thereof would be used to collect data for each critical element:

1. Actual use
    a. Livestock counts
    b. Wildlife counts or pellet transects by habitat areas
    c. Records supplied by operator
2. Utilization of key forage species
    a. Portable cages
    b. Permanent transects
    c. Temporary transects
3. Climatic conditions
    a. Rain gauges
    b. U.S. Weather Bureau statistics
4. Rangeland condition and trend
    a. Exclosures
    b. Permanent photo points
    c. Browse transects

Monitoring studies would be concurrent with grazing allocations proposed in the PA. Adjustments in livestock numbers due to drought or other emergencies would be accomplished under existing regulations and BLM Manual Section 4413 guidelines. Monitoring studies would also be designed to measure wildlife populations and browse utilization.

If monitoring shows the management objectives are not being met, the cause would be determined and corrective action would be taken. In allotments where monitoring shows an overall increase in forage production, additional livestock use may be authorized consistent with other resource needs. The increased grazing use would be authorized as a temporary increase until monitoring studies confirm the increase on a sustained basis. After increased forage for livestock has been confirmed, the increase may be added to the permittee's active preference.

During periods of drought (documented by precipitation data) or other emergencies such as fire, adjustment in livestock numbers would be made to protect the vegetal-soil resource. Whenever adjustments were needed, the permittees would be contacted and an attempt would be made to arrive at mutually agreed upon adjustments. If this were not possible, then needed adjustments would be put into effect by BLM decision.

Maintenance of Rangeland Improvements

Maintenance of rangeland improvements on public land is subject to policies and guidance contained in BLM Manual Section 7120. Fences and cattleguards constructed primarily for livestock management would be routinely maintained by permittees. Fences and cattleguards would continue to be maintained on an as needed basis.

The permittee would maintain all BLM-constructed water developments unless specific arrangements are made to the contrary. In these cases, the permittee's obligation would be periodic inspections, routine maintenance, and reporting of major damage, malfunction, or complete system failure.

Standard Operating Procedures

When rangeland improvements are implemented on public land, the BLM will adhere to procedures and design specifications to protect all resources. These are mandated through certain laws, executive orders, manual requirements, and policies. This EIS analyzes cumulative impacts of proposed rangeland improvements. However, prior to construction, site-specific EAs would be prepared to analyze the site-specific impacts from projects required for implementation of grazing management systems.

1. Roads or trails would be constructed only where existing roads and trails could not be used or when off-road travel is not possible.
2. Disturbance of soil and vegetation at all project sites would be held to a minimum.
3. Construction of all fences would be in accordance with design constraints in BLM Manual Section 1737.
4. Areas where the soils would be disturbed would be reclaimed.
5. A mixture of seeds of species adaptable to the area would be used where seeding is done following construction of rangeland improvement projects or vegetation treatments. The time and method of seeding prescribed by BLM policy will be used to achieve the best results for the intent of the seeding. A typical seed mixture which could be used on sandy loam sites within the lower elevations of the Planning Area is:

	Pounds of Seed Per Acre	
Species	Drilling	Broadcasting
Black grama	1 1/2	3
Fourwing saltbush	3 1/2	7
Sideoats grama	5	10
Lehmann lovegrass	1/8	1/4
Globemallow	1/4	1/2

Other forb species would be considered if a good source is available. Livestock grazing would be excluded from all newly seeded areas for a minimum of two growing seasons to allow seedlings to become established. This would not apply to small areas such as pipelines.

6. Soil maps and the BLM soil scientist would be consulted to determine areas where construction projects would have the least amount of impacts (e.g., areas on steep slopes and soils in critical or severe erosion condition class would be avoided).

7. A threatened, endangered, state listed, or sensitive species clearance will be conducted by an appropriate BLM staff biologist prior to the beginning of any project. If a "may affect" determination is made by the staff biologist, consultation will be undertaken with the agency (Fish and Wildlife Service, New Mexico Department of Game and Fish, or the New Mexico State Heritage Program) listing the species which may be affected. The results of the consultation will determine the course of action necessary to avoid adverse effects on listed species.

8. During nesting season, a raptor inventory would be conducted on areas proposed for vegetation treatment to identify and flag land within a 1/4 mile radius of active nests so they would not be disturbed by the proposed treatment.

9. New or expanded grazing use and support facilities would be regulated so that impairment of suitability for designation of proposed Areas of Critical Environmental Concern (ACECs) or crucial wildlife habitat would be evaluated and a decision made on a case-by-case basis.

10. Lands under wilderness review would be managed in a manner that would not impair the area's suitability as wilderness according to policy guidelines identified in BLM's Interim Management Policy and Guidelines for Land Under Wilderness Review (1979).

11. BLM would conduct intensive (Class III) cultural inventories on areas where surface disturbance would occur during project implementation. If historic or cultural properties are identified, every effort would be made to avoid adverse effects. However, where that is not possible, BLM would consult with the State Historic Preservation Officer and the Advisory Council on Historic Preservation in accordance with the Programmatic Memorandum of Agreement (PMOA) between the BLM, the Council, and the National Conference of State Historic Preservation Officers, dated January 14, 1980.

12. Visual resource contrast ratings would be completed as part of site-specific EAs prior to construction of all proposed rangeland improvements and implementation of grazing management treatments. If appropriate, mitigating measures would be developed on a case-by-case basis.

13. All refuse would be removed from work areas on public land and be disposed of in approved sanitary landfills.

14. Where BLM controls the water sources, water would be made available to wildlife when livestock are off the allotments or pastures.

15. Escape ramps would be required in all water troughs and open storage tanks.

Implementation Schedule

Following filing of the Final EIS, livestock permittees and other interest groups would be consulted on an allotment-by-allotment basis to establish the initial increment of livestock use, rangeland improvements, and grazing treatments. (Refer to Appendix A for consultation policy and guidelines.) Livestock adjustments made at the end of the 5-year monitoring period would be of sufficient magnitude to ensure a positive vegetative response or maintenance of satisfactory conditions.

Implementation of rangeland improvements, vegetation treatments, and grazing systems under the PA would occur over a nine-year period. (Refer to Appendix E-7 for the proposed implementation schedule by allotment.)

No Action (NA) Alternative

Under the NA Alternative, current livestock management practices would continue, and livestock forage allocations would be maintained at the present preference of 223,617 AUMs, although it is not expected that the actual use would exceed the 5-year average of 192,364 AUMs. Forage allocation to big game would remain at 2,721 AUMs. Figure 1-2 shows forage allocation under the NA Alternative.

Implementation of the NA Alternative would entail the following:

1. The 13 allotments (365,175 acres) which are currently under approved implemented AMPs would be managed intensively, while those not under AMPs (1,752,427 acres) would be managed as they are at present. No new grazing management systems would be designed or implemented.

2. Monitoring studies of actual use, key species utilization, rangeland condition and trend, and climatic conditions would continue to be conducted only on those allotments under existing AMPs.

3. No new rangeland improvements or vegetative treatments would be implemented in direct support of the grazing program, except that 8100 funds which are presently used for rangeland improvements would continue. First priority for these funds would be given to allotments with approved AMPs, then for the protection of existing soil, water, and vegetation resources. Also, the existing policy on operator-built rangeland improvements would continue. Funds will continue to be available for wildlife and watershed projects upon completion of resource activity plans.

Projects scheduled for completion on approved AMPs are seven miles of pipeline, five water troughs, and two cattleguards.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, all domestic livestock grazing on public land would be discontinued. All AUMs produced on public land would be available for wildlife, watershed, and aesthetics.

Funds for the rangeland improvements would be limited to those which benefit wildlife or watershed or for the protection of other resources. Figure 1-3 shows the forage allocation under the ELG Alternative.

Implementation of the ELG Alternative would entail the following:

1. Livestock grazing would be eliminated on 2,146,034 acres of public land, and 223,617 AUMs of grazing preference would be cancelled. No new grazing systems would be implemented, and those AMPs now implemented would be cancelled.

2. State and private lands intermingled with public land would have to be grazed in a manner to avoid livestock trespass on public land. The livestock operator would be responsible for avoiding trespass on public land. This could be accomplished by herding their livestock or by fencing state and private lands. Trailing permits would be issued to authorize livestock to travel across public land to national forest, state or private lands.

3. No rangeland improvements or treatments would be implemented or maintained unless needed for other BLM activities, such as wildlife and watershed. Rangeland improvements which would serve no useful purpose under the ELG Alternative would be removed from public land. These improvements would consist of internal fences which interfere with big game movements, corrals, etc. These types of improvements were constructed specifically for livestock management and would be of no use if livestock grazing were discontinued.

Maximization of Livestock Forage Production (MLFP) Alternative

The MLFP Alternative would initiate an intensive program of rangeland management techniques designed to achieve maximum forage production for livestock. Vegetation treatments would be implemented on 797,104 acres to convert existing areas dominated by mesquite, creosote, or tarbush to more desirable livestock forage. Rangeland improvements and intensive management as discussed under the PA would also be implemented. (See Appendix E-5 for proposed rangeland improvements under the MLFP Alternative.)

The initial authorized livestock AUMs would be the same as the proposed initial stocking rate under the PA (192,364 AUMs). Through the proposed vegetation treatments, anticipated forage allocation to livestock would increase to 305,609 AUMs in the long-term. Initial and proposed forage allocations to big game would be 1,766 AUMs and 4,299 AUMs respectively. Table 1-2 and Figure 1-4 show the forage allocation under the MLFP Alternative.

Implementation of the MLFP Alternative would entail the following:

1. Initial allocation in authorized livestock numbers would be made on an allotment-by-allotment basis as under the PA.

2. Intensive grazing management would be implemented on 90 allotments (1,577,530 acres), less intensive management on 95 allotments (174,897 acres), and present management would continue on the 13 allotments (365,175 acres) under AMPs. Vegetative treatments would be applied to 797,104 acres presently dominated by mesquite, creosote, or tarbush. Chemical treatment would be applied to 391,218 acres of mesquite and 381,203 acres of creosote. Mechanical treatment would be applied by rootplowing 11,765 acres of tarbush; 12,318 acres of creosote; and 600 acres of cholla. Table 1-4 shows proposed treatments by allotment and the estimated additional available AUMs by allotment and Map 1-3 shows the location of the treatment areas, species, and methods proposed for treatment.

   The chemical vegetation treatments would be conducted using the same chemicals and guidelines as discussed under the PA.

TABLE 1-4

SUMMARY OF PROPOSED VEGETATION TREATMENTS ON PUBLIC LAND
MAXIMIZATION OF LIVESTOCK FORAGE PRODUCTION

	Chemical Treatment (Acres)		Mechanical Treatment (Acres)			
Allotment Number	Creosote (Latr)	Mesquite (Prju)	Tarbush (Flce)	Creosote (Latr)	Cholla	Additional AUMs Available to Livestock through Manipulation
2002		2,856				450
2031		1,590				251
3001		10,373				1,555
3002		11,456				1,080
3003		19,548				2,830
3008		720				114
3009	5,200					524
3013	46,028	40,033	163	631		9,540
3016	6,122	32,652				5,652
3019		11				2
3020		56,540				8,842
3022		33,144				5,227
3023	7,046	36,398	551	367		6,443
3025	729					54
3028		1,007				259
3029		355				56
3033	16,078	9,282				3,238
3036	3,960					0
3038	692	19,063				572
3039		16,193				2,378
3041		1,907				301
3044		7,567				652
3045		1,410				222
3046		4,173				514
3047	7,862					524
3048		4,569				720
3052	1,044	12,818				2,462
5001	9,925	1,290				935
5002	6,507					443
5004	3,610					241
5007	9,844	1,062	585	2,904		1,547
5008	2,282			196		202
5009	10,924					882
5010		3,048				481
5013	5,134					516
6001			146			29
6002	3,205					214
6004	2,761					172
6016	2,859					101
6017	11,711		773			958
6018	9,403					627
6019	18,599					1,575
6020	18,101	5,120		3,734		2,354
6021	12,852		756			1,877
6022	19,731		1,439			2,326
6023	4,600					267
6024	5,798					387
6027	2,440					163
6032	683	9,160				1,362
6041	3,959					482
6042	2,321					155
6044	3,180					212
6050	3,561					237
6053	26,137	4,255	1,893	536		1,473
6054	3,243		771			372
6055	2,318					155
6056	8,898					712
6057	1,155					84
6059	2,187					146
6062	5,694	14,601	2,242	3,162		3,801
6065			865			173
6067	758					51
6068	1,629					109
6070	922					61
6074	4,253		331			510
6075	2,592					173
6079	736					49
6080	16,013					1,223
6081	2,556					234
6083	1,814		243			398
6084	23,078		1,007			2,826
6085	688					49
6086	452					30

TABLE 1-4 (concluded)

Allotment Number	Chemical Treatment (Acres)		Mechanical Treatment (Acres)			Additional AUMs Available to Livestock through Manipulation
	Creosote (Latr)	Mesquite (Prju)	Tarbush (Flce)	Creosote (Latr)	Cholla	
6091	2,889					36
6102	1,639				600	109
6103	1,149					77
6108	527					316
6110	2,411					161
6113	3,032					195
6144	657					44
6145	3,730	7				351
6146	1,310	18,995		788		3,324
TOTAL (Overall = 797,104)	391,218	381,203	11,765	12,318	600	90,539
Estimated Cost Per Acre	$8.00-$10.00	$20.00-$25.00	$35.00	$35.00	$20.00	
Estimated Total Cost	$3,129,744 - $3,912,180	$7,624,060 - $9,530,075	$411,775	$431,130	$12,000	

Source: BLM Las Cruces District Office Planning Documents, 1980.

3. Monitoring studies would be conducted to determine the effects of the vegetation treatments and management systems. These studies would consist of actual use, key forage species utilization, rangeland condition and trend, and climatic conditions.
4. Standards for all chemical treatment projects will follow Department of the Interior and BLM rules, regulations, and guidelines. (Refer to Appendix E-6.)

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, livestock grazing would be reduced approximately 40 percent from the PA to enhance wildlife habitat, protect watersheds, and reduce impacts on soils and cultural values. The initial allocation would be 192,364 AUMs, but at the end of the 5-year monitoring period, the allocation would be approximately 102,610 AUMs. The initial allocation to big game would be 1,766.

To achieve this level of use, livestock grazing would be eliminated on 14,456 acres of riparian habitat in poor or fair ecological condition, eliminated on 14,629 acres of watershed in critical or severe erosion classes, and reduced 50 percent from the PA on 1,438,784 acres in poor rangeland ecological condition and reduced 25 percent on 644,409 acres in fair condition. Approximately 13,511 acres of the riparian habitat proposed for fencing is withdrawn by the Water and Power Resources Service (formerly Bureau of Reclamation) for their Rio Grande Project. At present, BLM manages the grazing on the withdrawn land but no local memorandum of understanding (MOU) exists which outlines the responsibilities and authorities of the two agencies on this area. The management and protection of the riparian habitat was placed in the EORV Alternative because of the lack of a MOU. Table 1-5 shows the allotments, miles of fence, cost, and AUMs reduced.

Rangeland improvements and vegetation treatments would be implemented (as in the PA) to improve livestock forage, watershed values, and wildlife habitat. As the rangeland ecological condition and trend improved over the long-term, livestock forage allocations would be increased as conditions warranted. It is anticipated that by the year 2010 livestock forage allocation would be 214,360 AUMs and wildlife forage allocations would be 3,771 AUMs, the same as under the PA. Figure 1-5 shows forage allocation under the EORV Alternative.

Monitoring studies as discussed under the PA would be conducted under The EORV Alternative.

AUTHORIZING ACTIONS

Each permittee would be issued a term permit through the Las Cruces District Office. The permit would specify the allotment, period of use, and numbers and kind of livestock. Permits to graze in excess of the authorized use would be issued at the discretion of the Area Manager during periods when annual vegetation is available.

Changes in use that would be above the limits set by the permit would have to be requested in writing by the permittee and approved in advance of the grazing season. Grazing use above the limits set by the permit without authorization would be considered trespass, and trespass action would be taken by BLM in accordance with regulations in 43 CFR 4150.

INTERRELATIONSHIPS

Federal Programs

National Environmental Policy Act (NEPA)

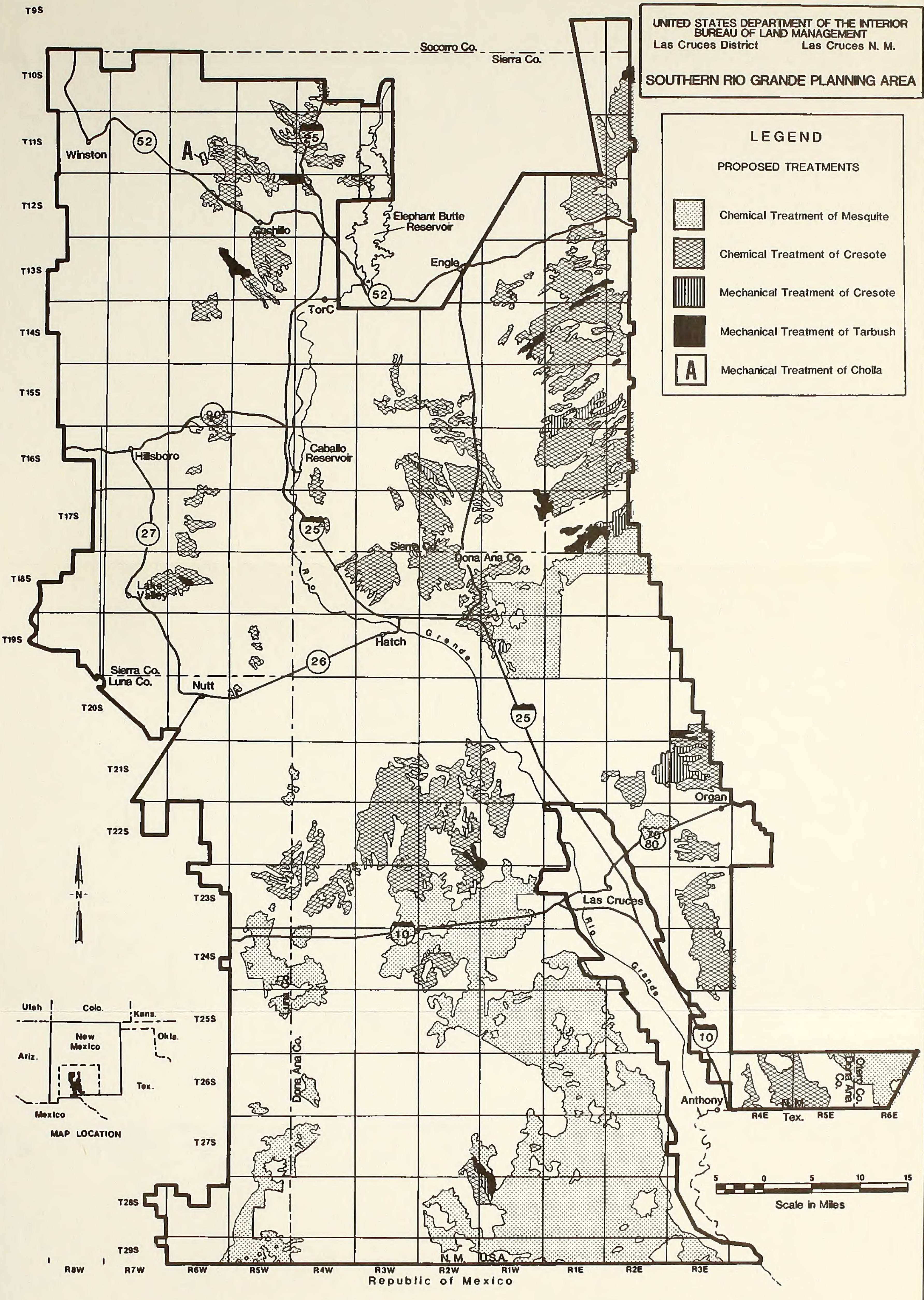
The PA is intended to create and maintain conditions under which man and nature can exist in productive harmony, and thus is consistent with the basic federal environmental policy set forth in Section 101(a) of NEPA. There are six specific environmental objectives of federal actions set forth in Section 101(b) of NEPA, as follows.

1. "To fulfill the responsibilities of each generation as trustee of the environment for succeeding generations."

2. "To assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings."

VEGETATIVE TREATMENT

(Maximization of Livestock Forage Production)


UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA

LEGEND

PROPOSED TREATMENTS

- ░ Chemical Treatment of Mesquite
- ▨ Chemical Treatment of Cresote
- ▥ Mechanical Treatment of Cresote
- ■ Mechanical Treatment of Tarbush
- A Mechanical Treatment of Cholla

SOURCE: BLM Las Cruces District Files 1980

MAP. 1-3 Vegetative Treatment

TABLE 1-5

ADDITIONAL RANGELAND IMPROVEMENTS AND GRAZING ADJUSTMENTS UNDER THE ENHANCEMENT OF OTHER RESOURCE VALUES ALTERNATIVE

Fencing of Riparian Areas

Allotment	Acres	Miles of Fence	Cost/Mile	Total Cost	Livestock AUMs Reduced
3013	40	1	$4,000	$ 4,000	4
6006	245	7	4,000	28,000	14
6045	209	0	4,000	0	8
6046	474	0	4,000	0	1
6048	1,125	3	4,000	12,000	24
6049	7,298	12	4,000	48,000	219
6050	332	2	4,000	8,000	3
6060	323	.3	4,000	1,200	57
6064	2,053	5	4,000	20,000	0
6089	1,672	10	4,000	40,000	17
6090	120	2	4,000	8,000	1
6117	320	1	4,000	4,000	46
6142	245	1.3	4,000	5,200	1
TOTALS	14,456a/	44.6		$178,400	395

Fencing of Watersheds in Severe or Critical Erosion Class

Allotment	Acres	Miles of Fence	Cost/Mile	Total Cost	Livestock AUMs Reduced
3003	1,175	2	$4,000	$ 8,000	2
3013	68	1.5	4,000	6,000	1
3016	3,596	10	4,000	40,000	119
3038	1,031	2	4,000	8,000	2
6002	2,442	9	4,000	36,000	110
6032	88	1.5	4,000	6,000	0
6035	196	2.75	4,000	11,000	3
6050	43	1	4,000	4,000	1
6062	1,555	7	4,000	28,000	50
6091	4,435	11	4,000	44,000	27
TOTALS	14,629	47.75		$191,000	315

Source: BLM Las Cruces District Office EIS Team Files, 1980.

Note: a/This acreage differs from that shown for Standard Habitat Sites shown in Table 2-8 because fences would be placed by legal subdivision.

3. "To attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences."

4. "To preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice."

5. "To achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities."

6. "To enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

The PA and the alternatives are expected to contribute to the achievement of these six goals in the following ways:

1. Initial reduction in livestock numbers and changes in livestock distribution under the PA and all alternatives, except the No Action Alternative, would enhance the quality of the vegetation (NEPA objective 6). The rangeland would continue to deteriorate under the No Action Alternative. The maximum attainable recycling of depletable resources would not be met under the Elimination of Livestock Grazing Alternative. Renewable forage on public land utilized by livestock under the PA and other alternatives would not be utilized.

2. Implementation of various design features would mitigate impacts of the PA and all alternatives, except the Elimination of Livestock Grazing Alternative, thus preserving important environmental elements (NEPA objective 4), minimizing environmental harm (NEPA objective 3), and protecting the surroundings (NEPA objective 2). The Elimination of Livestock Grazing would also meet NEPA objectives 2 and 4, but would not meet NEPA objective 3 because a beneficial use of public land (i.e., livestock grazing) would be eliminated.

3. Long-term increases in available livestock forage over the present 5-year average in the PA and all alternatives, except for the Elimination of Livestock Grazing Alternative and increases in forage for pronghorn and deer would achieve a more productive balance population and resource use (NEPA objective 5). The Elimination of Livestock Grazing Alternative would reduce the standard of living of livestock operators who now graze livestock on public land.

4. The environmental quality would be improved under the PA and all alternatives, except the No Action Alternative (NEPA objective 1). Under the No Action Alternative, rangeland that is currently deteriorating would not improve.

U.S. Fish and Wildlife Service (FWS)

The FWS is responsible for conducting predator and rodent control on public land when authorized by BLM. Permittees report instances of predation to FWS for documentation of livestock losses. All requests for predator control are incorporated into a district animal damage control plan and accompanying map which authorizes FWS to carry out a predator control program. During 1980, the FWS conducted active predator control programs on ten allotments in the Planning Area.

Rodent control on public land is requested by the permittee to FWS. Rodent control requests are then evaluated by BLM, FWS, and New Mexico Department of Game and Fish to determine vegetation resource damages or the potential for health hazards. Rodent control on public land is authorized by BLM with a request to the FWS for control services.

Consultation with the FWS is required before any project initiated or approved by BLM is implemented that may affect any threatened, endangered, or sensitive plant or animal or their habitat. This consultation is required by Section 7 of the Endangered Species Act of 1973. Consultation may be formal or informal, depending on the degree of disturbance caused by the projects. This EIS is considered a major project and formal consultation has been initiated. No biological opinion has been rendered at this time. (See Appendix D-5 for letters of consultation.)

Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS)

The ASCS and SCS provide assistance to landowners who want to improve their private rangelands. The ASCS provides cost-sharing of fences, water developments, erosion control, and vegetation treatment projects while the SCS provides the technical support in planning, surveying, and designing the projects. The SCS also assists permittees in designing ranch plans for ranches on private land. Presently, the SCS has approximately 15 ranch plans on ranches in the Planning Area, some of which contain public land. The primary objective of these ranch plans is to determine the vegetation utilization on the state and private lands. Coordination between BLM and SCS would be desirable particularly on those allotments where intensive management and monitoring is proposed.

U.S. Geological Survey (USGS) and Office of Surface Mining and Reclamation (OSM)

Surface disturbance associated with oil and gas, geothermal, and surface or underground mining activities would affect the implementation of the PA or alternatives. The use and rehabilitation of these disturbed areas must be coordinated between the BLM, USGS, and OSM.

White Sands Missile Range (WSMR)

This military withdrawal, which comprises the entire eastern boundary of the Planning Area, creates two distinct problems which will affect the success of the grazing program on those allotments which border WSMR and eight allotments lying inside a restricted area.

The first problem is the restriction of BLM personnel as well as others within the extension areas of WSMR. This will limit (over short periods of time) the activities which can occur on approximately 336,000 acres of public land.

The second and most important problem is that the east boundary of 17 allotments adjoining the WSMR are unfenced. Cattle have continually grazed adjacent portions of the WSMR since its withdrawal without any apparent conflict with military activities or action by the WSMR to discourage the unauthorized grazing. The control of livestock use and numbers in those adjoining allotments is difficult, even futile, without the active cooperation of the WSMR. To establish control would require over 120 miles of fence. Another method being considered would be to enter into a co-use agreement with the Department of Defense (DOD) authorizing grazing use within the WSMR.

Water and Power Resources Service (WPRS)

Presently BLM manages livestock grazing on approximately 28,000 acres of land withdrawn by the WPRS. Prior to any developments in this area, the WPRS must approve the projects.

The WPRS is in the process of surveying the withdrawn and fee-owned lands with the objective of writing a multiple use plan for these lands. Close cooperation between the BLM and WPRS would be necessary during the writing of this plan, as it would affect present BLM permittees. Also, close coordination between the two agencies would be necessary if fencing the withdrawn riparian areas is considered.

Advisory Council on Historic Preservation (ACHP)

On January 14, 1980, the Rangeland Programmatic Memorandum of Agreement (PMOA) between the BLM and ACHP pertaining to the Federal Livestock Grazing and Rangeland Management Program was ratified by the Chairman of the ACHP. The PMOA simplifies procedures to be followed in grazing EIS's and subsequent related actions for compliance with Section 106 of the National Historic Preservation Act. The intent of the PMOA is to reduce involvement with the ACHP while requiring close coordination with SHPO. Generally, the ACHP's comments will be requested only when SHPO and BLM cannot agree.

State Programs

State Historic Preservation Officer (SHPO)

The BLM cultural resource management program operates in accordance with CFR 36, Part 800, which provides specific procedures for consultation between BLM and SHPO. Memorandum of Understanding (MOU) NMSO-96 between the State of New Mexico through SHPO and the BLM New Mexico State Office became effective June 29, 1978. This MOU coordinates the provisions of 36 CFR 800 with existing BLM procedures, emphasizing the BLM planning system. The MOU incorporates procedures for exchanging information with SHPO concerning cultural resources on public land.

New Mexico Environmental Improvement Division (EID)

The EID, acting as staff to the New Mexico Water Quality Control Commission, has developed a statewide water quality control management plan in response to Section 208 of the Federal Clean Water Act of 1977 (P.L. 95-217). This plan includes an assessment of non-point sources of sediment and recommends best management practices (BMPs) for controlling sediment from various land uses. BLM will consider the content of the BMPs during development of management systems. The broad objective would be to improve the quality of runoff originating on public land.

State Engineer

The State Engineer is the official responsible for determining water rights in the Planning Area. Stock tanks of less than 10 acre-feet capacity do not require a formal water right; however, a water right is required for livestock wells in a designated ground water basin (Hot Springs, Lower Rio Grande, Hueco Basin, Mimbres Valley, Las Animas Upper Rio Grande, and Nutt-Hockett Basins). Water developments associated with BLM grazing management would be coordinated with the State Engineer's Office to ensure compliance with applicable state regulations.

New Mexico Department of Game and Fish (NMDGF)

A master Memorandum of Understanding between the NMDGF and Department of Interior, BLM, New Mexico State Office was signed on October 10, 1978 outlining the responsibilities of each agency in New Mexico. (Refer to Appendix D-4 for this Agreement.) The major thrust of the Agreement is that the NMDGF is responsible for the wildlife and the BLM is responsible for the habitat. Close coordination between the two agencies is necessary to protect and enhance the wildlife habitat within the Planning Area.

Another agreement between the two agencies refers to the coordination necessary before any vegetative treatment projects are started. The Las Cruces District would furnish the NMDGF plans for any proposed vegetation treatment projects at least 1 year prior to the implementation of the projects. The plans would include the method of treatment, the timeframe of the projects, maps of the areas involved, and acreages.

Consultation with the NMDGF would be necessary to determine if the PA would affect any state listed threatened or endangered species or their habitat.

New Mexico State Heritage Program (NMSHP)

Close coordination and consultation with the NMSHP will be necessary to determine if the construction of the proposed rangeland improvements and vegetation treatments would affect any state listed threatened, endangered, or sensitive plant species.

New Mexico State Department of Agriculture (NMSDA)

Close coordination between the BLM and NMSDA would be necessary to ensure that New Mexico state laws concerning the use of herbicides were complied with prior to any proposed vegetation treatments.

State and Private Lands

State and private lands comprise 1,304,000 acres (36 percent) within the Planning Area. The BLM, in consultation with private landowners and state lessees would influence the grazing (set grazing season, period of use, etc.) on unfenced intermingled private and state lands within allotments with AMPs. The BLM also will consult with the State Land Office and the private landowner when establishing grazing capacity on these intermingled lands.

The BLM issues two types of authorizations for recognizing grazing capacity of privately controlled lands: exchange-of-use agreements and percentage federal land permits. Exchange-of-use agreements may be issued to applicants owning or controlling non-public lands that are interspersed with and normally grazed in conjunction with public land, not to exceed the grazing capacity of the non-public lands. Percentage federal land permits are issued and generally restricted to allotments that are used and controlled by one operator. After the grazing capacity of all lands within the allotment is determined, the permittee would be billed only for the grazing capacity of the public land.

Section 8 of the Public Rangelands Improvement Act (43 U.S.C. 1901 et. seq.) requires consultation, cooperation, and coordination by BLM with lessees, permittees, landowners, the district advisory boards, and state agencies (refer to Appendix A for BLM Rangeland Consultation Policy in New Mexico).

IMPACTS

A display of the impacts of the PA and alternatives is shown in Table 1-6. Further discussion of these impacts is located in Chapter 3.

TABLE 1-6

COMPARISON OF IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

	Existing	Proposed Action		No Action Alternative Future Environment		Elimination of Livestock Grazing Alternative		Maximization of Livestock Forage Production Alternative		Enhancement of Other Resource Values Alternative	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Grazing Use (AUMs)	192,364[a/]	165,500[b/]	215,070	223,617[c/]	223,617[c/]	0	0	165,500[b/]	305,609	102,610[b/]	214,360
Physical Setting	stable	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vegetation											
Ecological Condition (acres)											
Good	32,318	NS	201,781	NS	17,181	NS+	312,887	NS	289,801	NS+	238,782
Fair	660,347	NS	1,014,334	NS	441,794	NS+	1,193,949	NS	1,230,195	NS+	1,074,226
Poor	1,453,369	NS	929,919	NS	1,687,059	NS+	639,198	NS	626,038	NS+	833,026
Forage Value (acres)											
Good	280,305	NS	357,512	NS	263,477	NS+	411,486	NS	444,975	NS+	374,873
Fair	668,885	NS	849,260	NS	621,522	NS+	1,038,047	NS	1,038,413	NS+	964,545
Poor	1,196,844	NS	939,262	NS	1,261,035	NS+	696,501	NS	662,646	NS+	806,616
Production (lbs/ac)[d/]											
Grass Type	333	NS	484	NS	316	NS+	556	1,109[f/]	713[g/]	NS+	520
Brush Type	165	NS	310	NS	157	NS+	358			NS+	333
Pinyon-Juniper Type	387	NS	520	NS	367	NS+	598			NS+	559
Composition (percent)[e/]											
Grass Type	50	NS	71	NS	47	NS+	80	84[f/]	58[g/]	NS+	76
Brush Type	30	NS	47	NS	29	NS+	55			NS+	51
Pinyon-Juniper Type	54	NS	68	NS	52	NS+	77				72
Threatened or Endangered (T/E) Plant Species	0	0	0	0	0	+	+	-[f/]	-[g/]	+	+
Soils											
Sediment Yield (acre-ft/sq mi/yr)	NC	NC	0.80[h/]	NC	NC	NC	0.62[h/]	NC	0.80[h/]	NC	0.75[h/]
Wildlife											
AUMs Allocated	2,721	1,766	3,771	2,721	2,721	[i/]	[i/]	1,766	3,771	1,766	3,771
Pronghorn Population[j/]	385	435	450	435	435	435	450	435	1,059	435	450
Deer Population[j/]	1,363	1,363	3,223	1,363	1,363	1,363	6,976	1,363	3,223	1,363	3,223
Estimated Overall Change in Standard Habitat Sites	E	E	I	E	0	I	I	E	I	I	I
Production of Desirable and Intermediate Shrub Species	E	E	0	E	E	E	I[k/]	E	0	E	0
T/E Animal Species											
Riparian Associated	0	0	-	0	-	+	+	0	-	+	+
Nonriparian Associated	0	0	+	0	-	+	+	0	+	+	+
Livestock Grazing											
Number of Operators	198	198	198	198	198	0	0	198	198	198	198
AUs	18,635	13,792	17,922	18,635	18,635	0	0	13,792	25,467	8,551	17,863
Water Resources											
Water Use (acre-feet/yr)	214	184	240	214	214	2	4	184	340	114	239
Surface Runoff (acres)											
0-9 percent decrease	NC	NC	2,146,034	NC	NC	NC	1,946,401	NC	2,146,034	NC	1,946,401
10-20 percent decrease	NC	NC	0	NC	NC	NC	199,633	NC	0	NC	199,633
Air Quality	stable	local dust increase	NS	NS	NS	dust decrease	dust decrease	local dust increase	NS	NS	dust decrease
Cultural Resources Rate of Disturbance from existing	-	NS	NS	NS	NS	+	+	-	+	+	+
Visual Resources	stable	NS	NS	NC	NC	NS+	NS+	-	NS	NS-	NS-
Wilderness	stable	NS	NS	NS	NS	NS+	NS+	NS	NS	NS	NS
Recreation											
Visitor Days	141,200	NS	NS	NC	NC	NS+	NS+	NS-	mixed±	NS-	NS-
Deer Hunting Visitor Days	2,787	2,787	6,243	2,787	2,787	2,787	13,216	2,787	6,243	2,787	6,243
Pronghorn Hunting Visitor Days	59	59	59	59	59	59	59	59	224	59	59
Economic Conditions											
Number of Ranches	153	153	153	153	153	104	45	153	153	137	100
Livestock Sales (millions $)	7.2	6.2	7.6	7.2	7.2	2.9	2.9	6.8	8.7	4.2	4.2
Net Cash Income (millions $)	3.7	3.2	3.9	3.7	3.7	1.0	1.0	3.5	4.5	1.3	1.3
Big Game Visitor Day Values											
Direct Income Effect	48,382	48,382	107,134	48,382	48,382	48,382	225,675	48,382	109,939	48,382	107,134
Regional Income Effect	69,573	69,573	154,058	69,573	69,573	69,573	324,520	69,573	158,091	69,573	154,058

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes:
a/Preference is 223,617 AUMs but 5-year average licensed use is 192,364.
b/Worst case basis.
c/Shows present preference, but actual use would probably average the same as the 5-year average of 192,364 AUMs.
d/Includes production of desirable and intermediate forage species only. (weighted average all condition classes)
e/Percent of total ground cover comprised of desirable and intermediate forage species (weighted average all condition classes).
f/Mechanical treatment and seedling only, other values same as PA.
g/Chemical treatment only, other values same as PA.
h/Variable depending on range site.
i/All AUMs available to wildlife.
j/Populations for areas with more than .5 animals per section (Map 2-2).
k/Assumes more than 10 points improvement in ecological condition class.

NC: No change from existing (changes not quantifiable)
NS: Not significant
+: Beneficial
-: Adverse
I: Increased value
E: Existing value
D: Decrease value
0: Zero

CHAPTER 2

AFFECTED ENVIRONMENT

CHAPTER 2

AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the environmental components of the Southern Rio Grande Planning Area (SRGPA) that would be affected by implementation of the proposed action and/or alternative(s). Components include: physical setting, vegetation, soils, wildlife, livestock grazing, water resources, air quality, cultural resources, visual resources, wilderness, recreation, areas of critical environmental concern, other land uses, and social and economic conditions. The length and detail of these descriptions are directly related to the expected magnitude, intensity, and duration of impacts as presented in Chapter 3.

PHYSICAL SETTING

Climate

The Planning Area has an arid to semi-arid, continental climate. The average annual precipitation ranges from 8 to 10 inches at lower elevations (less than 6,000 feet) to about 16 inches at higher elevations. Over half the yearly precipitation is received during the summer months when moisture-laden air from the Gulf of Mexico enters the area. Fall, winter, and spring are dry seasons because easterly circulating air from the Pacific Ocean loses most of its moisture before reaching the Planning Area.

The average annual temperature of the Planning Area is about 60°F. Daily maximum temperatures commonly exceed 100°F in June and July, but average about 95°F in the summer. Daily minimum temperatures average about 25°F in January, but occasional temperatures below 0°F have been recorded. Daily high to low ranges of 30°F or more are common throughout the year.

Wind speeds average about 6 miles per hour throughout the Planning Area. During the summer months, the prevailing wind direction is from the southeast as Gulf air moves northward. Brief, strong winds often accompany convectional thunderstorms during the summer months. In the winter, the prevailing wind direction is mostly from the north as Arctic air enters the area from the Pacific northwest. The spring months (March-May) are commonly referred to as the windy season. Dry, gusty winds from the west often exceed 30 miles per hour. The gusty winds coupled with dry soils occasionally cause severe afternoon dust storms.

The following shows the long-term average precipitation and the annual precipitation for the years 1975-1979 for some weather stations within the Planning Area (U.S. Department of Commerce):

Station	Long-Term Average	1975	1976	1977	1978	1979
NMSU	7.89	8.08	7.74	8.72	14.98	9.37
Jornada	8.47	8.92	11.14	7.32	15.45	6.11
Caballo	8.32	11.98	4.97	7.72	10.92	11.08
T or C	8.33	9.28	11.40	5.12	13.40	12.18
Hillsboro	10.80	17.24	11.66	14.51	15.13	15.41
Winston	11.59	16.90	11.03	13.94	13.74	13.28

Topography

The Planning Area is within the Basin and Range physiographic province. Typical topographic features include rugged and steep fault block mountain ranges, broad basins, and gentle volcanic land forms. Perhaps the most dominant topographic element is the Rio Grande Valley which extends about 130 miles through the Planning Area. Geologically, the major basins include the Mesilla Bolson, Palomas and Engle Basins, and the extensive Jornada del Muerto. The principal mountain ranges are the San Andres, Organ, Caballo, Cuchillo and the East and West Potrillos.

Elevations in the Planning Area range from a low of about 3,730 feet in the southern Rio Grande Valley to a high of about 8,990 feet at the summit of Organ Needle in the Organ Mountains. More typical elevations in the area range from 4,100 feet to 5,200 feet.

Geology

The dominant geological element in the Planning Area is the Rio Grande rift. This rift zone, which extends from the San Luis Valley near Alamosa, Colorado to the El Paso, Texas vicinity, is essentially a tensional or pull-apart feature in the earth's crust.

Volcanic rocks are widespread in the Planning Area, particularly in the western portion. Cinder cones and lava flows are especially prevalent in the southwestern portion of the Planning Area. Intrusive igneous rocks occur in the Organ, Dona Ana, Robledo, and Cuchillo Mountains.

The San Andres and Caballo Mountains contain thick sections of sedimentary strata. Sedimentary rocks also occur in the Franklin, Robledo, Dona Ana, and East Potrillo Mountains. The extensive basins in the Planning Area have accumulated thick sequences of sediments derived from the adjacent highlands.

Mineral resources in the Planning Area include potential geothermal energy associated with the Rio Grande rift, possible oil and gas accumulations in the basins, abundant sand and gravel along the terraces of the Rio Grande Valley, and deposits of fluorspar, barite, copper, lead, zinc, gold, silver, and iron in many of the old mining districts in the Planning Area.

VEGETATION

A vegetative inventory on 2,146,034 acres of public land in the Southern Rio Grande Planning Area (SRGPA) was conducted during 1978 and 1979. The Soil-Vegetation Inventory Method (SVIM) was used. Field data obtained during this inventory included vegetative production by plant species, percent composition, and percentage of ground cover by vegetative species, litter, pebbles, rocks, and bare ground. From field data, determinations were made as to ecological condition class, forage value class, and usable forage. Vegetative subtyping by dominant species aspect was completed prior to data gathering and does not always reflect the dominance by species composition. Methodologies used in the vegetative inventory and the analysis of the field data are explained in Appendix B-1. Locations of the various subtypes are shown on Visual B (located in map pocket) along with the range sites on which they occur. Major plant species occurring in the Planning Area are listed in Appendix B-5.

The SRGPA lies within parts of two Major Land Resource Areas (MLRAs) as described by the Soil Conservation Service (1979-80). The two areas included are MLRA 42 - Southern Desert, Subresource Area SD-2 and MLRA 36 - Western Plateau, Subresource Area WP-3.

The Southern Desert is characterized by gently sloping plains, broken by mountains which rise abruptly from the plains and the Rio Grande. Elevations range from 3,800 to 5,200 feet. Summer precipitation averages 8 to 10 inches. The soils in these areas will support both grassland and mixed grass-shrubland vegetation.

The Western Plateau is characterized by foothill topography with numerous canyons and dry washes adjacent to the mountains in the southwest part of New Mexico. Elevations range from 5,000 to 6,500 feet. Average annual precipitation is 12 to 16 inches. The soils in these areas will support a natural grassland vegetation with brush type species occurring on the steeper slopes and on the stony soils.

Over 96 percent of the Planning Area is in the Southern Desert MLRA with the remaining (4 percent) in the Western Plateau MLRA. Locations of the areas are shown on Map 2-1.

An analysis of the inventory data was made by range site, vegetative subtype, and ecological condition class and is presented in Appendix B-6. Presented are averages for the given number of transects relative to pounds of vegetative production for the 1978 growing season, percent vegetative and litter ground cover, and percent bare ground. Percent composition of grasses and shrubs is shown by both weight and ground cover by three categories relative to the desirabilities of the plant species by grazing animals based on preference and palatability of the species. These three categories are desirable, intermediate, and least desirable. Production and cover of forbs was not categorized as to desirability.

The total pounds of vegetation produced per acre during the 1978 growing season varied considerably between different sites. The production ranged from only a few pounds to over 3,000 pounds per acre. This variation in production existed on all range sites and within vegetation subtypes. The degree of difference was greater on the Southern Desert MLRA than on the Western Plateau MLRA. Average production of vegetation from the various subtypes occurring and each range site is presented in Appendix B-6.

The low average, high average, and weighted average vegetation production for each range site is presented in Table 2-1.

The ecological condition class rating is based on the present plant species composition in comparison to the potential plant species composition for a particular range site. Description of a potential plant community of the loamy (WP-3) range site as described by the Soil Conservation Service (1979-80) is shown in Appendix B-7.

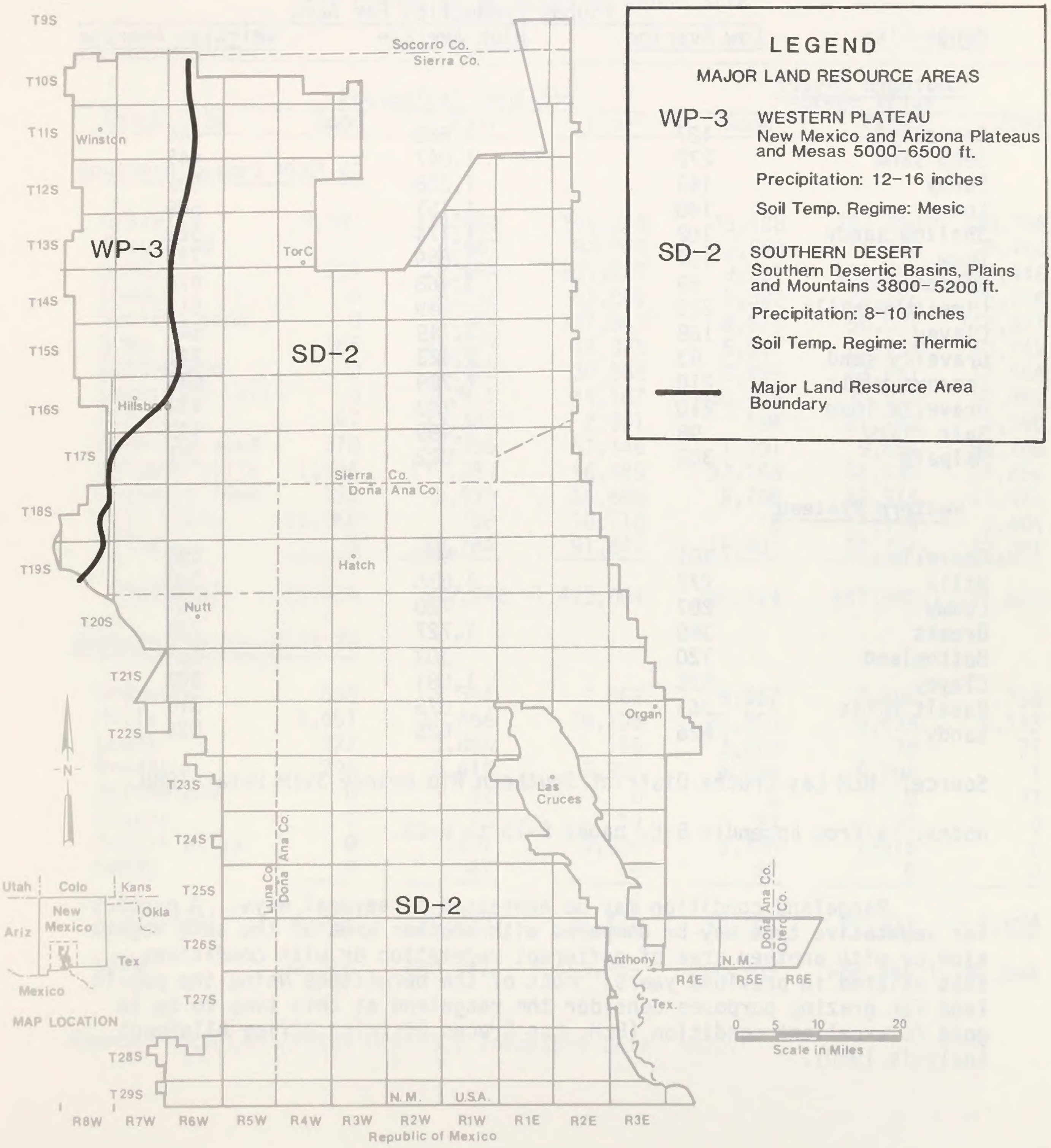
The forage value class rating differs from the ecological condition class rating in that it is based entirely on the existing vegetation instead of the potential. Dependent upon the abundance or lack of certain species, this rating can be higher, the same, or lower than the ecological condition. Methodology for determining forage value class ratings is shown in Appendix B-4.

Public land acres for each ecological condition and forage value class by range site is shown in Table 2-2. This data indicates there is a wide variation between the acres in each condition class among the various range sites. Total acres in each ecological condition class are: 32,318 - good (1.5 percent), 660,347 - fair (30.8 percent), and 1,453,369 - poor (67.7 percent). Total acres in each forage value class are 280,305 - good (13 percent), 668,885 - fair (31.2 percent), and 1,196,844 - poor (55.8 percent). Information pertaining to individual grazing allotments by acres, range site, and vegetative subtype is available for review at the Las Cruces District Office.

MAJOR LAND RESOURCE AREAS

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA



SOURCE: Soil Conservation Service 1977 and BLM Las Cruces Planning Documents

MAP. 2-1

TABLE 2-1

AVERAGE VEGETATION PRODUCTION BY RANGE SITE[a/]

Range Site	Pounds Production Per Acre Low Average	High Average	Weighted Average
Southern Desert			
Gravelly	127	1,688	445
Deep sand	272	1,047	445
Sandy	143	1,228	532
Loamy	140	1,151	509
Shallow sandy	102	1,174	529
Draw	131	1,859	775
Bottomland	69	3,468	875
Limestone hills	252	949	511
Clayey	168	1,149	647
Gravelly sand	83	1,423	341
Igneous hills	210	1,289	635
Gravelly loam	210	763	434
Salt flats	98	1,499	592
Malpais	305	822	541
Western Plateau			
Gravelly	301	993	696
Hills	277	1,836	690
Loamy	207	720	561
Breaks	369	1,727	713
Bottomland	120	303	233
Clayey	525	1,081	803
Basalt hills	363	675	516
Sandy	626	626	626

Source: BLM Las Cruces District Southern Rio Grande SVIM Data, 1980.

Notes: a/From Appendix B-6, pages B-15 to B-23.

Rangeland condition may be expressed in several ways. A particular vegetative type may be compared with another area of the same vegetation or with another area of different vegetation or with conditions that existed in previous years. Most of the permittees using the public land for grazing purposes consider the rangeland at this time to be in good to excellent condition (BLM, Las Cruces District Office Allotment Analysis 1980).

TABLE 2-2

ACRES FOR EACH ECOLOGIAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	8,531	314,860	250,215	45,128	207,690	320,788
Deep sand	0	4,667	42,318	3,092	15,128	28,765
Sandy	204	22,654	531,827	9,031	131,208	414,446
Loamy	0	6,038	57,001	5,527	28,226	29,286
Shallow sand	0	7,724	167,942	8,814	50,021	116,831
Draw	986	27,077	14,375	5,937	25,759	10,742
Bottomland	0	3,492	30,888	2,985	13,831	17,564
Limestone hills	0	31,811	44,107	30,516	30,533	14,869
Clayey	47	23,336	2,531	194	21,740	3,980
Gravelly sand	570	28,395	67,146	1,991	9,854	84,266
Igneous hills	1,896	111,383	56,689	97,168	48,536	24,264
Gravelly loam	160	9,939	54,698	5,708	15,515	43,574
Salt flats	15,060	788	10,710	0	17,154	9,404
Malpais	0	29,784	91,647	16,033	32,357	73,041
Subtotal	27,454	621,948	1,422,094	232,124	647,552	1,191,820
Western Plateau MLRA 36						
Gravelly	590	5,387	7,862	5,567	7,506	766
Hills	3,651	15,686	14,198	22,953	6,439	4,143
Loamy	327	2,868	155	3,203	70	77
Breaks	296	6,410	5,957	6,958	5,704	1
Bottomland	0	37	0	0	0	37
Clayey	0	23	99	23	99	0
Basalt hills	0	7,901	3,004	9,390	1,515	0
Sandy	0	87	0	87	0	0
Subtotal	4,864	38,399	31,275	48,181	21,333	5,024
TOTAL	32,318	660,347	1,453,369	280,305	668,885	1,196,844

Source: BLM Las Cruces District Inventory Data, 1980.

Information relative to trend on allotments without Allotment Management Plans (AMPs) is not available for the SRGPA. Trend studies have been in effect and studied for approximately 10 years on allotments in the Planning Area that have been under AMPs. The data from these studies indicate trend fluctuates from year-to-year in relation to the precipitation received which makes the influence of other factors difficult to measure. Overall, most of these studies show an upward trend occurring during extended periods of favorable climatic conditions and downward trends occurring during extended periods of unfavorable climatic conditions.

Major Vegetative Subtypes by Range Site

Data gathered in the 1978-79 vegetative inventory shows 34 vegetative subtypes occurring on 14 range sites in the Southern Desert MLRA and 14 vegetative subtypes occurring on eight range sites in the Western Plateau MLRA in the SRGPA.

Acres of public land in each vegetative subtype are shown in Table 2-3. Acres by range site and the major vegetative subtypes within each range site are shown in Table 2-4.

Major Vegetative Subtypes

Five vegetative subtypes occupy over 90 percent of the public land in SRGPA. These five subtypes, which are discussed later, occur on 15 or more of the different range sites. Six other vegetative subtypes occurring on more than five of the range sites account for over 6 percent of the total public land in the Planning Area. The other 24 subtypes occur on five or less range sites and account for less than 3 percent of the total public land acreage. See Appendix B-8 for acreages by vegetative subtype and range site.

Creosotebush

This species is dominant on 886,670 public land acres, more than 41 percent of the Planning Area. Over 58 percent occurs on the gravelly range site, being the dominant species on more than 90 percent of the range site. It occurs on all but one range site in the Southern Desert MLRA. It occurs in nearly pure stands in some locations, but is normally found growing in association with other low forage value brush species. These low forage value brush species account for an average of about 30 to 70 percent of the ground cover on the various range sites. Production in pounds per acre of annual growth of these brush type species in relation to the higher value forage species varies from range site to range site and averages range from approximately 20 percent of the total production on draw range sites to over 70 percent on sandy range sites. Ecological condition of the areas where creosote occurs range from poor to good depending upon associated species.

TABLE 2-3

PUBLIC LAND ACRES BY VEGETATIVE SUBTYPE

Vegetative Subtype	MLRA 42 (Acres)	MLRA 36 (Acres)
Annual forbs	3,327	0
Perennial forbs	1,955	0
Short grass	11,406	115
Mid grass	237,656	51,188
Tall grass	2,757	47
Creosotebush	885,250	1,420
Tarbush	40,938	414
Broom dalea	5,115	0
Winterfat	15	0
Mesquite	513,783	444
Fourwing saltbush	511	0
Mixed desert shrub	143,998	3,161
Sand sage	21	0
Mountain mahogany	558	0
Oakbrush	249	21
Mixed mountain shrub	2,639	0
Cactus	1,822	183
Yucca	31,924	0
White thorn	21,942	0
Sotol	7,462	0
Mariola	1,974	0
Snakeweed	109,279	1,236
Willow	1,058	0
Burrobush	1,547	0
Mormon tea	936	0
Sumac	2,513	0
Ocotillo	6,017	0
Sacahuista	1,162	0
Other shrubs	22,943	242
Desert willow	1,850	0
Cottonwood	142	0
Ponderosa pine	230	0
Pinyon-juniper	2,754	7,562
Pinyon	0	1,399
Juniper	3,051	7,106
Waste	2,712	0

Source: BLM Las Cruces District Office SVIM Data, 1980.

TABLE 2-4

PUBLIC LAND ACRES BY RANGE SITE AND MAJOR VEGETATIVE SUBTYPES

Range Site	Acres	Major Vegetative Subtype
Southern Desert MLRA 42 - SD-2		
Gravelly	573,606	Creosotebush, Mid grass, Mixed desert shrub
Deep sand	46,985	Mesquite, Creosotebush, Mixed desert shrub
Sandy	554,685	Mesquite, Creosotebush, Snakeweed
Loamy	63,039	Creosotebush, Tarbush, Mid grass
Shallow sandy	175,666	Creosotebush, Snakeweed, Mesquite
Draw	42,438	Mid grass, Tarbush, Creosotebush
Bottomland	34,380	Mid grass, Creosotebush, Mixed desert shrub
Limestone hills	75,918	Mixed desert shrub, Mid grass, Creosotebush
Clayey	25,914	Mid grass
Gravelly sand	96,111	Creosotebush, Mixed desert shrub, Mesquite
Igneous hills	169,968	Mid grass, Creosotebush, Mixed desert shrub
Gravelly loam	64,797	Creosotebush, Snakeweed, Tarbush
Salt flats	26,558	Mid grass, Mesquite
Malpais	121,431	Creosotebush, Mid grass, Snakeweed
Western Plateau MLRA 36 - WP-3		
Gravelly	13,839	Mid grass, Juniper, Creosotebush
Hills	33,535	Mid grass, Pinyon-Juniper, Pinyon
Loamy	3,350	Mid grass
Breaks	12,663	Mid grass, Juniper
Bottomland	37	Mid grass
Clayey	122	Other shrubs, Mid grass
Basalt hills	10,905	Mid grass, Juniper, Pinyon-Juniper
Sandy	87	Mixed desert shrub
Planning Area Total	2,146,034	

Source: BLM Las Cruces District Office SVIM Data, 1980.

Mesquite

This species is dominant on 514,227 public land acres, nearly 24 percent of the Planning Area. Over 82 percent of the mesquite subtype occurs on the sandy range sites, being the dominant species on more than 76 percent of this range site. It occurs as the dominant species at some locations in all but one of the range sites in the Southern Desert MLRA. Mesquite along with other low forage value brush species account for an average of about 14 to 73 percent of the vegetative ground cover depending upon range sites. Production in pounds per acre of annual growth of these brush type species in relation to the higher value forage species varied from about 5 percent on the draw and clayey range sites to 73 percent on the gravelly sand range site. Ecological condition of the areas where mesquite is dominant is usually poor, but varies from poor to good depending upon associated species.

Mid-Grass

Mid-grasses were typed as the dominant vegetation on 288,844 public land acres, more than 11 percent of the Southern Desert MLRA and over 68 percent of the Western Plateau MLRA. Mid-grasses occurred as the dominant vegetation on portions of 20 out of the 22 range sites ranging from only a very small amount on the deep sand range site to over 70 percent of the salt flats range sites in the Southern Desert MLRA to more than 60 percent of most of the range sites in the Western Plateau MLRA. Percentages of ground cover and vegetative production, made up of mid-grasses, varied from range site to range site and range from nearly 90 percent of both cover and production down to 8 percent of the vegetative ground cover and 12 percent of the production on the gravelly loam range sites.

Major grass species occurring on the various range sites include:

1. Tobosa and black grama on gravelly sites
2. Dropseeds and tobosa on sandy sites
3. Tobosa and gramas on loamy, gravelly loam, hill, and malpais sites
4. Gramas and dropseeds on shallow sandy sites
5. Tobosa on draw and clayey sites
6. Tobosa and alkali sacaton on bottomland and salt flat sites

Mixed Desert Shrub

Mixed desert shrub (a classification for numerous shrubs none of which are dominant) occurs on 147,159 public land acres, nearly 7 percent of the Planning Area. Mixed desert shrubs are found mainly on the various hill range sites, but also occur on malpais, gravelly, and sandy sites. This subtype occurs on 15 of the 22 different range sites. Production by species varies from range site to range site and ranges from 12 to 70 percent desirable forage species. Sixty-five percent of the total production is low value brush species. Species which have medium to high forage value include fourwing saltbush, mountain mahogany, winterfat, Apacheplume, Mormon tea, feather peabush, Wright's buckwheat, and bull cods.

Snakeweed

This species is dominant on 110,515 public land acres, slightly more than 5 percent of the Planning Area. This species was typed as being dominant on parts of 15 of the 22 range sites, but is more prevalent on the shallow sandy, sandy, gravelly loam, and malpais range sites. Species composition varies from site to site, but percent of the total production made up of low value brush species range from 10 to nearly 60 percent. The percent of the total vegetative ground cover occupied by these low value forage species range from 15 to 60 percent. Ecological condition class rating is poor to good depending on associated species.

The other subtypes make up a minor part of the total acres of the Planning Area. Information relative to ground cover and production is presented in Appendix B-6.

Forage Species

The phenology of the more important forage species is shown in Appendix B-11. The various growth stages and approximate range of dates that the plant may be in during a particular growth stage are noted for each of the important forage species. Appendix B-12 shows the variance of the phenological stages that occurred in bush muhly from 1974 to 1976. This is probably typical of the variability in plant development that can be expected in the warm-season perennial grasses in the Planning Area.

The listing of the forage species is primarily comprised of warm-season perennial grasses and a few cool-season shrubs. Management designed around these species would benefit other desirable forage plants as well.

Annual grasses and forbs were not listed, although they are recognized as being vitally important and contribute substantially to the diet of range cattle on semidesert rangelands.

Studies using esophageal fistulated animals show that cattle diets contain about 30 percent forbs on a yearly basis (Pieper and Beck 1980; Gonzalez-Rodriguez et al. 1978; Rosiere et al. 1975; Galt 1969; Herbal and Nelson 1966). Rosiere et al. (1975) found that although perennial grasses represented a dependable source of forage, they never comprised more than 50 percent of a steer's diet in any season. Therefore, a general concensus of the range scientists and educators is that livestock operators and rangeland managers need to be more aware of the importance of forbs in livestock diets and that perennial grasses should not be the sole criterion for estimating forage production or determining stocking rates.

Poisonous Plants

Livestock poisoning from certain plants cause problems during some years. Poisonous plant species which occur in the Planning Area are listed below (Norris and Valentine 1957; Herbel et al. 1974; Southern Rio Grande SVIM Data 1980.)

Common Name	Animals Affected	Toxic Season
Lecheguilla	sheep	winter, spring
Mountain mahogany	cattle, horses, sheep	summer, fall
Snakeweeds	cattle, sheep	spring
Yerba-de-pasmo	cattle, sheep	fall, winter
Juniper	cattle	all year
Beargrass	cattle, sheep	spring
Ponderosa pine	cattle	spring
Mesquite	cattle	spring, summer
Groundsels	cattle, horses	winter, spring
Pigweeds	horses, cattle	all year
Milkweeds	cattle, sheep	spring, summer
Loco weeds	cattle, horses, sheep	spring, summer
Desert marigold	sheep	spring, summer
Lambsquarter	horses, cattle	all year
Larkspur	cattle	spring, summer
Tansy mustard	cattle, sheep	winter, spring
Spurge	cattle, sheep	all year
Bitterweed	cattle, sheep	winter, spring
Pinque	sheep	all year
Lupines	sheep	summer
Russian thistle	horses, cattle	all year
Annual goldeneye	cattle	fall
Death camas	cattle, horses, sheep	spring, summer
Inkweed	cattle, sheep	summer, fall
Cocklebur	cattle, sheep	spring

Threatened, Endangered or Sensitive Plants

Plant species occurring in the Planning Area which are on the federal list and those which have been selected by the New Mexico State Heritage Program as being a special concern element are listed in Table 2-5. Reported locations of these plants on public land in the SRGPA are listed in Appendix B-9.

SOILS

Three separate soil surveys conducted by the Soil Conservation Service inventoried soil types within the Planning Area and gathered interpretive data about the representative soils present. This data was compiled in soil surveys of Dona Ana County (August, 1980), Luna County (May, 1980), and Sierra County (unpublished pending final correlation). On public rangeland, order three level surveys were conducted. Higher intensity second-order surveys were conducted on the potential agricultural lands such as identified in the Rio Grande Valley.

The soil surveys depict map units which are made up of one or more soil series (e.g. Simona-Harrisburg association.) Soils within a given soil series have similar diagnostic features and characteristics. The soil series (and classifications of each) occurring in the SRGPA are shown in Appendix C-1.

Soils with the potential for producing distinctive native plant communities and with similar range interpretations and erosion class ratings are grouped into range sites. Acres and major vegetative subtypes for each of the range sites are shown in Table 2-4. Appendix C-2 shows physical and chemical parameters for each of the soil series in map units making up the range sites.

Areas of the sandy and shallow sandy range sites occur throughout the southern part of the Planning Area and make up approximately one-third of the total public land acres of the SRGPA (See Visual B located in map pocket). Soils of these sites are nearly level to gently sloping, shallow to deep, with textures of fine sand and loamy fine sand underlain by calcareous loamy fine sands and fine sandy loams. Shallow caliche layers are present in shallow sandy sites.

Over one-fourth of the Planning Area is made up of areas of the gravelly range site (Visual B). Soils of this site formed in calcareous gravelly alluvium on fans and pediment toe slopes of the various hills and mountain ranges throughout the Planning Area. They range from shallow to deep, nearly level to steep, and commonly have a layer high in calcium carbonates (caliche) within 30 inches of the surface. The surface textures are very gravelly sandy loams and loams underlain by caliche which may or may not be cemented.

Other major soils of the Planning Area include thin, stony loams and clay loams on the various hills range sites; deep fine textured

TABLE 2-5

THREATENED, ENDANGERED, AND SENSITIVE PLANTS WHICH OCCUR IN THE SOUTHERN RIO GRANDE PLANNING AREA

Federal Threatened or Endangered

Corypantha sneedii sneedii
Echinocereus lloydii

Sensitive Species*

Astragalus castetteri
Cerus greggii
Fraxinus cuspidata var. macropetala
Helianthus laciniatus crenatus
Oenothera organensis
Opuntia arenaria
Penstemon alamosensis
Perityle cernua
Rosa stellata
Silene plankii

State Listed

Aletes filifolius
Amelanchier australis
Castilleja orgenorum
Cryptantha paysonii
Draba standleyi
Limonium limbatum
Opuntia wootonii
Penstemon lanceolatus
Perityle staurophylla var. homoflora
Polygala rimulicola
Rubus exrubicundus
Scrophularia laevis
Talinum longipes

Sources: New Mexico State Heritage Program, 1980.
U.S. Fish and Wildlife Service, 1980.
Federal Register, December 15, 1980.

Note: *Sensitive species are under review by U. S. Fish and Wildlife Service.

soils in the lowland draw and bottomland range sites; fine textured, salt affected soils of the salt flats range site; and thin, stony loams derived from basalt on lava flows which make up the malpais range site.

Soil Erosion

Based on limited sediment studies in the Planning Area, the highest sediment yields occur on sparsely vegetated breaks along the Rio Grande Valley and from watersheds originating in the mountain ranges south of Caballo Reservoir.

Climate, topography, ground cover, and physical soil properties (texture, coarse fragments, restrictive layers, etc.) are primary factors influencing the amount of sediment transported by runoff water. Using the Pacific Southwest Interagency Committee Method (PSIAC 1968), the major factors were rated to arrive at an estimation of sediment yield for each of the range sites in the Planning Area. The results are shown in Table 2-7. A discussion of the PSIAC methodology is located in Appendix C-4.

In a 1979 report prepared for and filed in the Las Cruces District Office by Earth Environmental Consultants Inc. (Contract No. YA-512-CT8-170), sediment which had accumulated behind detention structures was measured on four watersheds in the Planning Area. The past history of the detention structures made it possible to determine sediment production from the particular watershed. The watersheds and measured sediment yields are shown in Table 2-6.

TABLE 2-6

MEASURED SEDIMENT YIELDS FROM FOUR MAJOR WATERSHEDS IN PLANNING AREA

Watershed	Measured Sediment Yield ac.ft./sq.mi./yr.
Green Canyon	1.85
Uvas (Broad Canyon)	0.42
Fillmore Arroyo	0.61
Tortugas Arroyo	0.86

Source: Earth Environmental Consultants Inc., 1979.

Prior to construction of the flood detention structures, studies were conducted on various watersheds (Anthony, Fillmore, North Fork, and Caballo arroyos) by Elephant Butte Irrigation District with guidance from the Soil Conservation Service (SCS). The studies were part of the

TABLE 2-7

ESTIMATED SEDIMENT YIELDS BY RANGE SITES

Range Site and MLRA	Acres	Average Total PSIAC Rating	Estimated Sediment Yield ac.ft./sq.mi./yr.
Southern Desert			
Gravelly	573,606	57	0.64
Deep sand	46,985	39	0.34
Sandy	554,685	27	0.22
Loamy	63,039	36	0.30
Shallow sandy	175,666	32	0.26
Draw and Bottomland[a/]	76,818	26	0.21
Limestone hills and Igneous hills[a/]	245,886	56	0.62
Clayey	25,914	22	0.16
Gravelly sand and Arroyos	96,111	66	0.87
Gravelly loam	64,797	47	0.45
Salt flats	26,558	25	0.20
Malpais	121,431	30	0.24
Western Plateau			
Gravelly	13,839	45	0.42
Hills	33,535	50	0.50
Loamy, Sandy, Clayey, and Bottomland[b/]	3,596	38	0.32
Breaks	12,663	56	0.62
Basalt hills	10,905	52	0.53

Source: BLM Las Cruces District Office Files, 1979.

Notes: a/Range sites were combined because rated factors (including soil types) are similar.

b/Combined total acreages account for only 0.2% of Planning Area.

work plans drawn up under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 566). Sediment yields between 0.3 and 1.5 acre-feet per square mile per year were estimated for the various watersheds in the Planning Area.

Surface texture, coarse fragments, moisture content, and calcium carbonate percentages are primary factors influencing a soil's susceptibility to erosion by wind. Soils having similar properties that affect their resistance to soil blowing (when cultivated) make up a Wind Erodibility Group (WEG). WEGs rate a soil from 1 through 8 with 1 being sandy soils with less resistance to wind erosion and 8 being clayey and stony soils with the greatest resistance to wind erosion.

Soils of the sandy and deep sand range sites are most susceptible to erosion by wind, whereas soils of the bottomland and hills range sites are least susceptible. Appendix C-3 gives the WEG for each of the soil series in the Planning Area. The soil series are listed by range site and association.

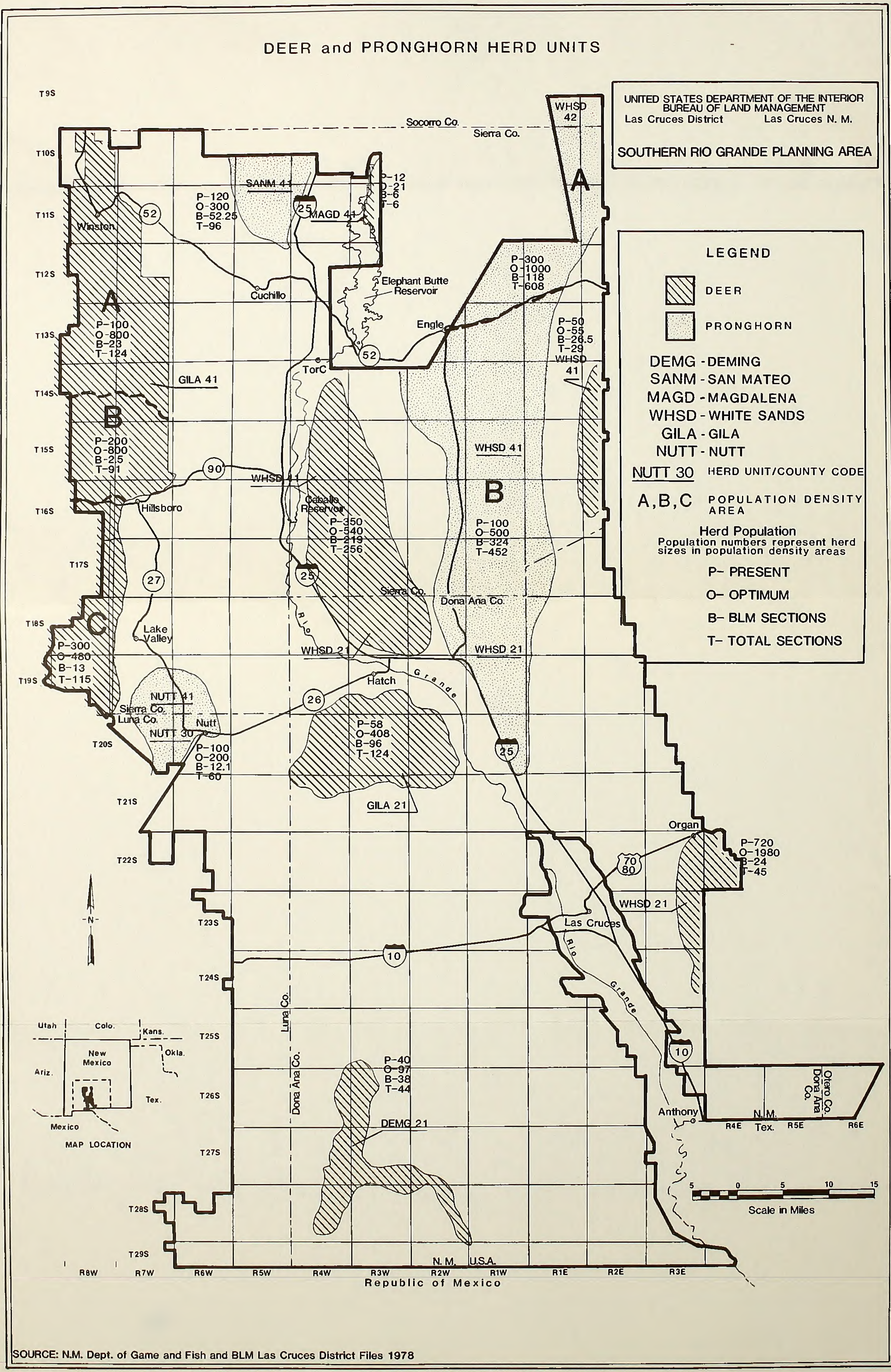
WILDLIFE

The Planning Area was mapped into habitat sites based on vegetation and landform (See Visual C). Selected habitat sites were sampled for occurrence of vertebrate species. The following Standard Habitat Sites (SHS's), (grouping of like habitat sites) were identified in the Planning Area. (Visual C shows some habitat sites on "hills" landform. The "hills" landform sites are included in the discussions for the rolling upland landform: for example, grass hills would be included in grass rolling upland in the discussions.) Wildlife species and their preferred SHS's are shown in Appendix D-1. As shown in Appendix D-1, some species use several habitat types equally, while other species are restricted in habitat use. Big game species are discussed in relation to the SHS's and separately in relation to herd units (Map 2-2). Raptors are discussed separately because they are not easily related to SHS's. (See Appendix D-3 for methodology used in the wildlife section.)

Standard Habitat Sites (SHS's)

Riparian

As illustrated on Table 2-8, this SHS makes up less than one percent of the Planning Area, with the majority being located on Water and Power Resources Service withdrawn and fee-owned land. The number of wildlife species using this SHS as preferred habitat (153) is much higher than any other SHS. Most of the SHS is in poor condition. Of the 16 site write-up areas (SWAs) reviewed, 14 are in poor ecological condition and two are in fair ecological condition. Although the small mammal and summer bird diversity indexes for the riparian types is the highest of all 14 SHS's, the plant and structural diversity is not nearly that expected for the SHS in relation to the other habitats (See Table 2-8). Dahlem (1979) reports that riparian habitats are very attractive to domestic livestock and that many riparian areas are overused and abused by livestock grazing. Based on BLM files, Dahlem's reports seem to apply to riparian habitats in the Planning Area. One AMP allotment in the Planning Area is divided into two pastures, one of which includes about 50 percent riparian habitat. Allocation to livestock is 2,840 AUMs of which 64 percent is from the river pasture. Past monitoring of the AMP has been conducted in the mountain pasture with no monitoring in the river pasture. Based on deer observed during the inventory, deer use in the riparian SHS would be 1.4 per section. Percentages of game bird summer observations during the inventory were mourning dove, 4 percent; scaled quail, 8 percent; and Gambel's quail, 39 percent.



SOURCE: N.M. Dept. of Game and Fish and BLM Las Cruces District Files 1978

MAP. 2-2 Deer and Pronghorn Herd Units

TABLE 2-8

STANDARD HABITAT SITES COMPARISON DATA[a]

Standard Habitat Type	Inventoried Acres in Planning Area	Diversity Index Small Mammals	Diversity Index Plants	Average Number Plant Species	Number Vert. Species Using As Preferred	Number Vert. Species Reliant on SHS for Preferred	Diversity Index Summer Birds[b]	Average Structural Diversity Index
Riparian	13,642[c] (131 public) 1%	1.796	.0610	12.2	153	128	3.488	.070
Pseudoriparian	43,270 1.5%	ND	.730	10.6	31	13	2.402	.083
Grass Rolling Upland	218,451 7.5%	1.707	.0478	14.6	49	11	1.557	.034
Grass Flat	159,671 5.5%	1.294	.0457	17.3	49	11	.878	.023
Grass Mountain	107,178 3.7%	1.212	.0669	19.1	35	9	2.280	.053
Mixed Shrub Rolling Upland	75,741 2.6%	1.162	.0611	15.3	32	12	2.046	.056
Mixed Shrub Mountain	58,516 2.0%	1.162	.1005	16.25	32	12	1.296	.064
Mesquite Rolling Upland	113,622 3.9%	1.033	.0567	12.6	10	6	1.668	.070
Half-shrub Rolling Upland	214,113 7.4%	0.915	.0594	14	10	6	1.659	.063
Pinyon-Juniper Grass Mountain	50,702 1.7%	0.858	.0673	21.4	68	62	1.884	.126
Malpais	35,250 1.2%	ND	.0669	13.3	2	0	ND	.040
Creosote Rolling Upland	995,290 34.2%	0.682	.0517	12.4	32	8	1.969	.039
Creosote Breaks	154,042 5.3%	ND	.0612	12	23	3	2.058	.042
Mesquite Sand Dunes	669,188 23%	0.617	.0573	9	14	10	1.937	.069

Sources: BLM Las Cruces District Office Inventory Files, 1980; Davis, 1980; American Ag International, 1979.

Notes: a/See Appendix D-3 for Methodology.
b/Calculated from Caballo and Organ Mountain Planning Unit Inventory Records.
c/Water and Power Resources Service has withdrawn 13,511 acres. The remaining 131 acres are on public land. This acreage differs from that shown in Table 1-5 because this is the acreage which comprises the riparian SHS, not the fenced area.

Pseudoriparian

This SHS includes the larger dry washes in the Planning Area with a noticeable difference in structural diversity in the vegetative community, because of an increase in shrubs and trees such as littleleaf sumac and desert willow. There was insufficient sampling in this SHS to provide a small mammal species diversity index comparable to the index used in other SHS descriptions. Summer bird diversity, however, is second only to the riparian SHS at 2.402. Plant diversity, at an index of .0730, is second only to the mixed shrub mountain SHS. Raitt and Maze (1968) demonstrated the importance of the SHS to birds, which, while not reliant on the SHS as preferred habitat, make extensive use of the SHS for nesting. The pseudoriparian SHS includes about 43,270 acres (1.5 percent) of the Planning Area.

Estimated deer and pronghorn populations in this SHS are 3.9 and .1 per section, respectively. The deer estimate is the highest in the Planning Area. Upland game bird summer observations made during the inventory were mourning dove, 84 percent; scaled quail, 3 percent; and Gambel's quail, 46 percent; the highest percentage for both dove and scaled quail.

Grass Rolling Upland

This SHS usually has a higher percentage of grama grasses than tobosa and has gravelly soils. Various shrubs are interspersed in the SHS which provides some structural diversity. As indicated on Table 2-8, the small mammal species diversity index is high at an index of 1.707. This SHS makes up approximately 220,000 acres (7.5 percent) of the Planning Area. This SHS is preferred habitat for pronghorn. Under improper management, this SHS is subject to reduced cover and an increase in abundance of shrubs such as creosote which is detrimental to pronghorn. Pronghorn use in this SHS is estimated to average .4 animals per section. Some deer use also occurs, with an estimate of .3 per section. Only two other SHS's have a lower summer bird diversity index (1.557). Summer game bird observations were mourning dove, 1 percent; scaled quail, 15 percent; and Gambel's quail, 7 percent; significant only for scaled quail.

Grass Flat

Approximately 160,000 acres (5.5 percent) of the Planning Area was mapped as being grass flat habitat. The SHS is usually dominated by tobosa grass. Some areas of this SHS are dominated by alkali sacaton. This SHS is usually located on broad swales which receive flood overflow. Structural diversity is the lowest of all the habitat types in the Planning Area, while the small mammal diversity is relatively high (index of 1.294, third), probably a reflection of those species of vertebrates reliant on dense grass cover. Depending on grass density, this type may provide habitat suitable for pronghorn. Analysis of the vegetation data (SVIM) indicates that the grass flat SHS in poor ecological condition has the highest composition by weight of desirable and intermediate shrubs of any SHS. Shrub composition by weight drops rapidly as ecological condition improves. Deer and pronghorn estimated use is .1 per section for both species. The lowest bird diversity index was also for this SHS at .878, although the number of individual birds recorded (468) was second only to the pseudoriparian SHS (BLM inventory files). All summer game bird records represent less than one percent for all species.

Grass Mountain

Within the Planning Area, approximately 101,000 acres (3.7 percent) were typed as grass mountain. Summer bird diversity ranks third (2.280), small mammal diversity (1.212) is fourth of the 14 SHS's. There are usually a variety of shrubs and small trees interspersed in this SHS. According to American Ag International, Inc. (1979), this SHS is second only to pseudoriparian as preferred habitat for deer, and may be used by pronghorn where adjacent to the grass rolling upland type. Deer use is estimated to be 1.9 animals per section and pronghorn use is estimated to average .1 per section. The third highest bird diversity index (2.280) was calculated for the grass mountain SHS. Comparison of shrub production in this habitat type indicates that the highest production occurs in a poor ecological condition class, with the lowest shrub production in a fair ecological condition class. If the ecological condition class is increased to good, shrub production increases. A precursory review of the vegetation inventory data seems to indicate that shrub species important to big game are more productive in the fair and good ecological condition classes. Scaled quail summer observations represent 5 percent of observations for the species. Summer observations were not made for other game bird species.

Mixed Shrub Rolling Upland

The mixed shrub rolling upland SHS (approximately 76,000 acres or 2.6 percent of the Planning Area) is moderate in plant diversity and slightly lower than the grass types in small mammal species diversity. Structural diversity is slightly higher than for the grass types which corresponds to an observed increase in bird use (sixth in bird diversity). This SHS is characterized by an interspersion of various shrub species with no clear dominant species. Depending on the mixture of shrubs in individual sites, this SHS may be moderately important to deer on the bajadas (foothills) of mountain areas. Deer are estimated to use this SHS at 1.6 per section. As in the grass mountain SHS, shrub production decreases as ecological condition class improves, but with an apparent increase in shrubs important to big game species. Summer game bird observations were significant only for scaled quail, at 17 percent.

Mixed Shrub Mountain

The mixed shrub mountain SHS (approximately 58,500 acres or 2 percent of the Planning Area) usually occurs between the mixed shrub rolling upland SHS and the pinyon-juniper zone. The SHS generally contains a higher percentage of important browse species than the rolling upland equivalent. This SHS contains the highest diversity index for plant species of all types, a slight increase in structural diversity and a moderate small mammal diversity index. Summer bird diversity is low, perhaps because of the structure of the plant community, which includes such plants as sotol and basket grass. This SHS may be the preferred type for desert bighorn sheep (see Table 2-9) and is of major importance to mule deer. Deer populations in this SHS are estimated to be 2.1 animals per section.

As in other habitats important to deer, shrub production apparently is lower in a fair ecological condition class than in poor, but is considerably higher in good condition than in fair condition. Apparently, production of shrub species important to big game is much higher in the good ecological condition class. Presently, 51 percent of this SHS is in fair ecological condition, the lowest class in terms of shrub production. Seven percent of scaled quail summer observations were made in this habitat.

Mesquite Rolling Upland

The mesquite rolling upland SHS (approximately 113,600 acres or 3.9 percent of the Planning Area) presents an aspect of small, unduned, mesquite "trees" and shrubs. Associated vegetation is variable and may range from sparse broom snakeweed to good stands of grasses. This SHS presents a moderate to high structural diversity. However, summer bird diversity is relatively low (ninth of the SHS's) in relation to the structural diversity. Average pronghorn use is estimated to be .1 per section. No deer observations were reported. Shrub production (desirable and intermediate species) drops from about 40 pounds per acre to about 1 pound per acre between poor and fair ecological condition classes. Eighty-two percent of the SHS is presently in poor ecological condition. This SHS provided 21 percent of summer scaled quail observations, the highest of all SHS's. Three percent of mourning dove observations were in this SHS.

Half-Shrub Rolling Upland

The half-shrub rolling upland SHS is dominated by broom snakeweed, often with a scattering of mesquite. Soaptree yucca is often conspicuous. The half-shrub SHS occupies about 214,000 acres (7.4 percent) of the Planning Area. Pronghorn may use the SHS, especially when forbs are abundant. The SHS may also be important to raptors because of open hunting conditions and available nest sites in the yuccas. This SHS is moderate to low in all diversity categories. About 2 percent of deer observations were recorded in this SHS during the inventory. No pronghorn observations were recorded. Desirable shrub production declines from 12.97 to 11.71 pounds per acre with improvement from poor to fair ecological condition. Seventy-four percent of the SWAs in the Planning Area of this SHS are in poor ecological condition. Of the summer game bird observations, only Gambel's quail are significant at 7 percent.

TABLE 2-9

FEDERAL AND STATE ENDANGERED FAUNA SPECIES OCCURRENCE BY STANDARD HABITAT SITE

COMMON NAME	SCIENTIFIC NAME	Latr Rup	Latr Breaks	Latr Hill a/	Mxsh Mountain	Mxsh Hill a/	Mxsh Rup	Hash Rup	Grass Rup	Grass Hill a/	Grass Mountain	Grass Flat	Malpais	Prju Rup	Prju Dunes	Pinyon-Juniper	Pseudoriparian	Riparian Forest a/	Riparian Woodland a/	Stock Tank	No Preferred Habitat	Special Habitat Features, Comments	Management Recommendations, Methods: Locations
Desert bighorn sheep b/Status S-I	*Ovis canadensis mexicana*				1c/						2												State listed. Occasional reports from Organ Mts. If confirmed, reevaluate grazing & recreation
Olivaceous cormorant Status S-II	*Phalacrocorax olivaceus*																		1	2		Rio Grande Valley	Protect all BLM tracts along river with trees with potential for establishing trees, especially for nesting and roosting.
Mississippi kite Status S-II	*Ictinia misisippiensis*																2		1	2		Rio Grande Valley Other riparian	As above, other riparian or pseudoriparian areas with trees or potential for trees
Black hawk Status S-I	*Buteogallus anthracinus*															2		1	1			Riparian	As above, protect nests from disturbance.
Bald eagle Status F-E S-II	*Haliaeetus leucocephalus*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	2		Riparian with trees, fish, rock pinnacles, cliffs near water	May be found districtwide during movements. Management applies to eyries and concentration areas. Protect riparian as above, eyries if found.
Caracara Status S-I	*Polyborus cheriway auduboni*	2	2	2				3									1		1	2		Rio Grande Valley	Protect riparian vegetation, protect any nest sites from disturbance or harassment.
Peregine falcon Status F-E S-I	*Falco peregrinus anatum*								2	2	2	2			2						Amer. Ag. 1	Cliffs, water	Primary concern: protection of eyries from all sources of disturbance. Maintain prey base. Prju SDN & grass from inventory records.
Aplomado falcon Status S-I	*Falco femoralis septentrionalis*	4	4	4	2	4	3	2	2	1	1	1	4	4	4	4	3	4	4	4		yucca-nest sites	Extirpated, possibly due to overgrazing. Recovery might occur with improvement of grasslands.
Whooping crane Status F-E S-II	*Grus americana*	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	2		Riparian, wetland areas. Hatch-Nutt, Columbus areas.	Maintain good ground cover (grass) on all open riparian/wetland areas. May occur any SHS during movements. Caballo lake area important.
Red-headed woodpecker Status S-II	*Melanerpes erythocephalus caurinus*																		1			Lowland riparian areas. Not confirmed SRG.	Protect riparian areas. Do not permit operations near such areas which may attract starlings, supplemental feeding.
Bell's vireo Status S-II	*Vireo bellii*																2		1	2		Riparian areas with dense shrubs.	Protect riparian. Place livestock waters as far away from pseudoriprian areas as possible.
Baird's sparrow Status S-II	*Ammodramus bairdii*							2	1	1	1	1					3						Maintain grasslands with scattered shrubs. Autumn and spring migrant, assure spring grass cover, seed supply.
McCown's longspur Status S-II	*Calcarius mccownii*							3	2	2	1	2					4						Winter resident S. half NM grazing at grassland habitat related to decline. Promote grass seed protection, winter grass cover.
Gila Monster Status S-I	*Heloderma suspectum*	1			1	1	1								2		1		1			Thick brush	Protection from illegal collecting and wanton killing main protective measures. Few and questionable records SRG. Kilbourne Hole.
Trans-Pecos rat snake Status S-II	*Elaphe subocularis*	1	1			1	1															Known primarily from Rio Grande Valley vicinity	Protection from illegal collection and wanton killing main protective measures. Excessive loss of desert habitat would be detrimental.
Sonora Mt. king snake Status S-II	*Lampropeltis pyromelana pyromelana*				2											1		1					Protection from illegal collection and wanton killing.
Mexican tetra Status S-II	*Astyanax mexicanus*																					Rio Grande	Watershed protection to minimize erosion and resultant siltation.
Bluntnose shiner Status S-I	*Notropis simus*																					Rio Grande	Extirpated. As above.
Silvery minnow Status S-II	*Hybognathus nuchalis*																					Rio Grande	As for Mexican tetra

Sources: Amer. Ag. Contract Report to BLM, 1979
SRG URA Step 2 - Animals, 1979
Endangered Amphibians and Reptiles of Seven Southwestern New Mexico Counties, 1978
State Endangered Species Handbook, 1979

Notes: a/Hill types not discussed in narrative (see Rolling Uplands). Riparian discussed as one type in narrative.

b/Status Code
F-E - Federal Endangered
S-I - State, Group I (Endangered)
S-II - State, Group II (Threatened)
c/One (1) represents most important habitat, higher numbers less important habitat.

Pinyon-Juniper Grass Mountain

The pinyon-juniper grass mountain (P-J) SHS generally occurs on mountain ranges at elevations above 6,000 feet in the Planning Area. There are only about 50,700 acres (1.7 percent) of this SHS in the area. On Table 2-8, a high number of species are shown to be reliant on this SHS for preferred habitat. On Table 2-8, the small mammal diversity index is low. This SHS is ninth in bird diversity, but is second only to the riparian SHS in the number of vertebrate species using the type as preferred habitat. The P-J type provides the highest structural diversity index and the third largest plant species diversity index of all the types. P-J is variable in the density and composition of the dominant and associated plant species. The value of the SHS to wildlife depends on the composition of the plant community. The SHS is usually important to deer, with an estimated population of 2.3 deer per section. Fifty percent of the sites in this SHS are in fair ecological condition, which appears to be the lowest class for desirable and intermediate shrub production at 13.29 pounds per acre. Good ecological condition sites produce an average of 28.18 pounds per acre, and poor condition sites produce 24.34 pounds per acre of desirable and intermediate shrub species. Although the sample size obtained during the inventory is small, apparently the browse species most preferred by deer increases as ecological condition class improves. Insignificant summer game bird observations for all species were recorded for this SHS.

Malpais

The SHS includes areas where surface flows of volcanic rock have occurred and dominate the area. The SHS occupies about 35,000 acres in the area (1.2 percent) and exhibits a moderate plant diversity and a low structural diversity. The faunal composition is usually similar to other adjacent habitat types with an increased abundance of rock associated species. Lava flows may produce animal populations exhibiting melanistic tendencies. A portion of the Aden Lava Flow has been designated a Research Natural Area, partially due to researchers interest in the melanistic trend. A wildlife diversity index was not calculated for this SHS because sampling records were combined with adjacent types. No deer observations and less than one percent of pronghorn sightings were recorded in this SHS during the inventory. Desirable and intermediate shrub species production declines from about 22 to 12 pounds per acre between poor and fair ecological condition classes.

Creosote Rolling Uplands

The creosote rolling upland SHS occupies the most acreage (about 995,000 acres or 34.2 percent) of the Planning Area. The SHS is generally low in cover, structural diversity and plant and small mammal diversity. The diversity of summer birds is seventh of the 14 SHS's. The creosotebush is dominant with tarbush occasionally being a codominant. The overall value of the SHS as wildlife habitat is generally low, although 13 percent of deer observations and 10 percent of pronghorn observations were recorded in this SHS. Although a high percentage of big game observations were made in this SHS, the acreage involved means a very low big game use of this SHS is occurring, with deer use estimated to be .1 per section. Seventy percent of this SHS is in poor ecological condition. Improvement from a poor to fair ecological condition results in production of desirable and intermediate shrub species from about 6 pounds per acre to about 12 pounds per acre. This SHS was the second highest in adjusted summer observations for scaled quail at 18 percent. Three percent of mourning dove observations were in this SHS.

Creosote Breaks

The creosote breaks SHS is located on the bases of hills and mesas along the Rio Grande Valley and occupy about 154,000 acres or 5.3 percent of the Planning Area. This may be the only SHS in the Planning Area where the creosotebush is a climax dominant, although the production of understory grasses and shrubs has been lost due to erosion (American Ag International, Inc. 1979). Insufficient data are available to calculate a small mammal diversity index. Structural diversity and plant species diversity are slightly higher than for the creosote rolling upland areas. Bird use is probably higher in the creosote breaks than in the creosote rolling uplands because of proximity to the river valley. The summer bird diversity index is third only to the riparian and pseudo-riparian SHS's. Sixty-five percent of the creosote breaks SHS is in poor ecological condition, producing about 9 pounds per acre of desirable and intermediate shrub species. Improvement by one ecological condition class increases production to over 15 pounds per acre. About 2 percent of deer observations were in this SHS. Insignificant summer game bird observations were reported for this SHS, with only scaled quail showing some use.

Mesquite Sand Dunes

This is the second largest SHS in the Planning Area (about 669,000 acres or 23 percent). The dominant feature of this type is mesquite "trees" on sand dunes. Other shrubs such as fourwing saltbush, soaptree yucca, and sand sage are interspersed in the mesquite dune areas. Little perennial grass is found on this type. Depending on precipitation conditions, there may be significant production of annual grasses and forbs. The small mammal diversity index is the lowest of all the habitat types, although in terms of relative abundance and relative biomass, this SHS contains the greatest abundance of small mammals (BLM Inventory Files). Springer (1979) calculates that in poor condition mesquite dune areas, rodents and rabbits consume 32 percent of the annual plant production. Of the 14 SHS's identified, this SHS is seventh in summer bird diversity at an index of 1.937. Two percent of deer sightings were reported in this SHS. No pronghorn sightings were reported. As in the creosote rolling upland SHS, the percentage of deer sightings compared to the acres of the SHS available indicates very low levels of deer use. Production of desirable and intermediate shrubs declines slightly between poor and fair ecological condition sites, from about 32 to 28 pounds per acre. Eighty-eight percent of the habitat sites are in poor ecological condition. Of the summer game bird observations, only scaled quail were recorded at one percent of the adjusted observations for the species in this SHS.

Big Game

Deer

Deer, primarily mule deer, may be found throughout the Planning Area. The areas shown on Map 2-2 are those areas within the herd units where the habitat is believed to be capable of supporting more than .5 deer per section. Most of the better deer habitat is found on the mountain landform, with some inclusion of rolling uplands. Pseudo-riparian habitats are also important, as shown on Table 2-10. All of the herd unit populations are below optimum according to information jointly developed by the New Mexico Department of Game and Fish and BLM. Compilation of the vegetation inventory data obtained for the Planning Area indicates that there is currently sufficient forage available to support optimum deer populations. However, browse transect data shows that with existing numbers of deer, browse utilization is close to allowable use, indicating that competition with livestock is contributing to the existing less than optimum populations. Forage quality may also be limiting. A review of available literature indicates that preferred browse plants are frequently low in energy, crude protein, or phosphorus at some period of the year, depending on location. Wallmo (1978) reports that the critical level (7 percent crude protein) is somewhat deficient during the spring in southwest New Mexico. Fecal analysis work from several mountain ranges in southern New Mexico including deer habitats in the Planning Area, show that both deer and cattle use of forbs is about 30 percent in spring (BLM Files). Pieper and Beck (1980) reported on protein and phosphorus content of forbs for Fort Stanton, New Mexico showing levels well above the minimum requirement for deer. The nutrients in forbs may be critical for deer reproduction. Little information is available on cool-season forb production in the Planning Area. BLM Manual 6601-6 presents data showing deer selectivity for forbs may far exceed availability. Population estimates by herd unit are shown on Map 2-2.

TABLE 2-10

ESTIMATED GAME USE OF STANDARD HABITAT SITES

Standard Habitat Sites	Estimated Big Game per Section in Planning Area from Observation Records[a/]		Estimated Pounds Annual Production per Acre, Desirable & Intermediate Shrubs	Percent of Upland Game Bird Records by SHS		
	Deer	Pronghorn		Mourning Dove	Scaled Quail	Gambel's Quail
Riparian	1.4	0	ND	4	8	39
Pseudoriparian	3.9	0.1	8	84	3	46
Grass rolling upland	0.3	0.4	14	1	15	7
Grass flat	0.1	0.1	86	1	1	0
Grass mountain	1.9	0.3	13	0	5	0
Mixed shrub rolling upland	1.6	T	28	2	17	1
Mixed shrub mountain	2.1	0	31	1	7	0
Mesquite rolling upland	0	0.2	33	3	21	1
Half-shrub rolling upland	0.1	0	13	1	1	7
Pinyon-juniper grass mountain	2.3	T	19	0	0	0
Malpais	ND	T	18	ND	ND	ND
Creosote rolling upland	0.1	T	8	3	18	0
Creosote breaks	0.1	0	9	0	2	0
Mesquite sand dune	T	0	32	0	1	0

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes: a/Bias is probable in observations. Deer are more easily observed in grass mountain habitats than in mixed shrub mountain habitats. T = Estimates of less than 0.1 animals per section, but with recorded use. Estimates are based on 1,500 deer and 500 pronghorn over the Planning Area, or an additional 137 deer outside the population areas shown on Map 2-2. The above provides a measure of relative use of Standard Habitat Sites by big game and game birds.

Pronghorn

Pronghorn habitat presently occupied in the Planning Area (in order of decreasing value) include grass rolling upland, grass mountain, half-shrub rolling upland, creosote rolling upland, mesquite rolling upland and grass flat (see Visual C). In addition to the occupied areas shown on Map 2-2, pronghorn may occasionally be seen in other areas and the New Mexico Department of Game and Fish is currently formulating plans to reintroduce pronghorn into suitable habitats in the Planning Area, which are historic ranges (Findley 1975). According to Donaldson (1980), a large half-shrub rolling upland and grass rolling upland area west of Las Cruces is a likely location for reintroduction.

The discussion about forage quality for deer also applies to pronghorn. Forbs may be even more important to pronghorn than deer because of the low availability of browse in grasslands. Several investigators (Engelking 1979; Glidewell 1970) have reported that on desert grassland areas pronghorn are dependent on forbs. Howard et al. (1973), from a study on the Jornada Experimental Range, found 54 species of known food items for pronghorn (5 grasses, 35 forbs, and 14 shrubs). Approximately 76.9 percent of these species are commonly found in grasslands. Five pronghorn fecal samples collected in the Planning Area (three in May and two in July 1978) show heavy use of forbs. Howard et al. (1973) found that shrubs and forbs constitute 13 and 7 percent, respectively, of vegetation cover on the Jornada in the grass types. Howard et al. (1973) concluded that the Jornada Range, in its present condition, is not good pronghorn habitat because of a limited amount of suitable habitat and low density of shrubs and forbs, and suggested that low rainfall may be a limiting factor. Hailey (1966) reported that a pronghorn die-off in Trans-Pecos, Texas was the result of drought coupled with severe overgrazing, and net wire fences reducing available forage to tarbush. Sixty percent of the herd studied died with evidence of tarbush toxicity present in 83 percent of the dead animals examined. Hailey also refers to fetal reabsorption in pronghorn, an adaptive feature which reduces the number of fawns when forage is low or of poor quality. The above references and inventory data imply that ecological condition of pronghorn habitat is limiting existing populations more than competition. Existing population estimates are shown on Map 2-2.

Raptors

Raptors (hawks, eagles, and owls) were surveyed by recording incidental observations, and by driving raptor routes on dirt roads and recording the raptors seen. The raptor data is difficult to relate to SHS's. The Las Uvas Planning Unit (PU) portion of the Planning Area was noted as having a high relative abundance of wintering raptors, at 21 individuals per 100 miles of route driven, or three times the relative abundance of the remainder of the Planning Area. The attraction of the Las Uvas PU for wintering raptors is uncertain, but based on the available habitat types, and the percentages of those types in the other PUs, a combination of the percentage of mesquite rolling upland and mesquite sand dunes most closely matches the relative abundance of wintering raptor populations. For those raptors which are opportunistic feeders or prey primarily on small mammals, the mesquite types provide high levels of prey biomass as represented on Table 2-8.

Swainson's hawk nests were the most abundant raptor nests located in the Planning Area. Most of the nests were located on soaptree yuccas in the Las Uvas PU. Unpublished food habits information taken in the Las Uvas PU shows the highest biomass food item to be spotted ground squirrels, which are most abundant in the mesquite types. The highest frequency food item (32 percent) is the western whiptail lizard, which may be primarily associated with the half-shrub rolling upland SHS, but also occurs in mesquite sand dunes. Another factor which may contribute to the high relative abundance of raptors in the Las Uvas area is the abundant soaptree yucca, which is used for nest and perch sites. The only sightings of peregrine falcons during the inventory were in the Las Uvas where three individual sightings occurred during the winter.

Threatened or Endangered Species

Table 2-9 summarizes endangered fauna species occurring or potentially occurring in the Planning Area and the habitat preferences of these species.

LIVESTOCK GRAZING

Operations

Presently there are 198 grazing allotments in the SRGPA The grazing allotments are comprised of intermingled private, state and public lands and sometimes uncontrolled land (land for which the operator has no title or lease agreement). Generally, the lands are not fenced separately and are grazed without regard to land status. Pastures or rangeland units are fenced in relation to physical aspects of the terrain, such as vegetative types or topography. Ranch headquarters and major water developments (i.e., windmills or wells) are usually located on private or state lands while supplemental water developments (i.e., earthen reservoirs, pipelines and troughs) are located on public land.

Period of Use - Kind of Livestock - Type of Operation

Thirteen of the allotments are grazed under an Allotment Management Plan (AMP). The AMP allotments are set up on a grazing schedule which allows either a complete year's rest or a grazing season deferment of one or more pastures in the allotment. Pastures in other allotments are grazed yearlong under the direct management of the permittee. It is recognized that continuous yearlong grazing is the most common practice of grazing semidesert ranges (Martin 1975). All of the livestock operators graze cattle. A few saddle horses are run in conjunction with the cattle operation. Most of the breeding herds are Hereford, Angus, or Brangus; however, crossbreeding with various exotic breeds also occurs. The majority of the herds are commercial quality bred to registered or purebred bulls.

Cow-calf operations are predominant in the Planning Area. The cows are generally bred to calve in the spring and the calves are sold in the fall, however, yearlong breeding programs are also common. The percentage calf crops and weaning weights are of top concern to the cow-calf operator. The calf-crop percentage for the area is reported to range from 63.4 to 77 percent (Gray et al. 1981 and Gray 1970). Death loss averages about 3 percent. Weaning weights are estimated to average 400 pounds for steers and 380 pounds for heifers. Short yearlings (less than 1 year old) generally weigh from 550 to 580 pounds when sold (Gray 1970). Gray, et al. (1981) reported that calf market weights ranged from 433 pounds on small-sized ranches to 456 pounds on large ranches.

Some operators run yearlings along with their cow-calf operation. This provides for more flexibility in adjusting livestock numbers in dry years when forage production is reduced. Weaner calves may be kept through the winter and marketed in the spring as short yearlings, or are sometimes kept through the summer and marketed in the fall as long yearlings. Straight yearling operations are uncommon in the Planning Area. There are two yearling operations in the area; however, they may change from year-to-year.

Major Problems Affecting Livestock Production

The major problems affecting livestock production in the Planning Area are drought, stocking rates, and livestock distribution.

Drought periods and times of low forage production are normal features of rangelands that may be associated with successional changes in the vegetation. Too often grazing by livestock is blamed for changes that are more directly related to climatic factors. Drought is a real problem for the rancher in southern New Mexico. Herbel, et al. (1974) reports that during 53 years of record on the Jornada Experimental Range (which lies within the Planning Area) 24 years or 45 percent were drought years. Drought has been defined as any year or sequence of years when annual precipitation is 75 percent or less than average. Drought influences many characteristics of rangeland vegetation such as vigor, production, composition, cover, and plant mortality (Pieper and Donart 1975). Nelson (1934) evaluated the impact of drought and grazing on black grama rangelands in southern New Mexico and found that the production of heavily overgrazed rangeland declined 81 percent compared with a decline of 58 percent on conservatively grazed rangeland. Herbel and Gould (1973) report from the Jornada Experimental Range that drought periods are frequent and expected, and that the rangeland is indeed very fragile. Perennial grasses are often severely reduced, and any improvement is very slow if at all. Black grama cover on the Jornada Range has been reduced as high as 50 percent of its pre-drought average on some areas, and on many sites it has not yet recovered.

Consequently, a reduction of desirable forage species affects livestock production. Wallace and Foster (1975) report that livestock production is lowered considerably by the affects of drought. Conception rates drop as well as weaning weights. A forced sale of breeding stock may occur, or additional supplemental feed may be required. Thus, operators who maintain a breeding herd of 55 to 60 percent, with the remainder comprised of yearlings, have more flexibility to accomodate drought situations (Herbel, et al. 1974). Herbel and Nelson (1969) have emphasized that since the forage crop is highly variable from year-to-year, assumptions that a constant stocking rate based on average years can be maintained is to invite rangeland resource destruction. Thereby, flexible herd management to allow adjustments during drought would help to alleviate lowered livestock production rates resulting from drought.

Managing rangeland under constant stocking rates has always been a dilemma for the public rangeland managing agencies. However, in cooperation with the permittee, temporary stocking adjustments have and can be provided for by the permittee making application for "temporary non-use" on a portion of his grazing privileges as defined in the grazing regulations (43 CFR 4115.2(e)(11)). The grazing regulations also provide for "suspended preference" in which active grazing may be disallowed in those cases where the grazing preference exceeds the amount of available forage allocated for livestock. Regardless of the provision for adjusting, stocking rates present considerable rangeland management problems if excessive to proper stocking.

The present and proposed grazing capacities for the Planning Area are shown by allotment and land ownership in Appendix E-2. (Uncontrolled AUMs can be added to controlled AUMs when a permittee shows evidence of control of those lands.)

Livestock distribution is another problem on desert rangelands that affects livestock production. Livestock move over any pasture in response to the number and location of watering places, topography, forage, and size of pasture (Herbel 1974). Salting, fencing, protein supplement, rubbing posts, and riding are all means that are used to improve distribution. However, water is perhaps the most limiting factor regarding distribution on several grazing allotments in the Planning Area. Areas that receive light grazing use or none at all would likely become more suitable by development of water, such as a stock tank or a pipeline and trough from a well. Many of these water developments and other proposed rangeland improvements are shown by allotment and cost in Appendix E-4.

WATER RESOURCES

Surface Water

The SRGPA includes parts of four major surface water drainage basins as recognized by the New Mexico State Engineer (Map 2-3). Three of the four basins are closed--the Jornada del Muerto, Tularosa (Hueco), and Mimbres (including the Las Uvas Valley). The closed basins have no surface drainage outlets and are usually dry, but runoff water will accumulate in lowland areas for short durations during periods of high rainfall. The Rio Grande Basin is an open basin with the north-south running river being the major perennial water within the Planning Area. The river channel and flow are completely controlled by dams, levees, and canals.

The Elephant Butte and Caballo Dams (in the Rio Grande Valley) provide large surface water storage reservoirs for irrigation, electric power generation, flood control, and recreational purposes. Storage capacities of the Elephant Butte and Caballo reservoirs are 2,137,000 and 344,000 acre-feet, respectively. The dams are under the jurisdiction of the Water and Power Resources Service (formerly Bureau of Reclamation), whereas the Elephant Butte Irrigation District has authority over the irrigation waters.

Tributaries to the Rio Grande are ephemeral, flowing only in times of storm events. At higher elevations, short stretches of stream flow occur below springs, but the water seeps back into the ground long before reaching the Rio Grande. Since runoff only occurs periodically (during storm events) the amount of runoff which reaches the Rio Grande is difficult to measure. Watersheds dominated by grass vegetation have lower estimated runoff rates than watersheds of equal size dominated by creosote vegetation, assuming similar soils and equal storm frequencies and durations (Earth Environmental Consultants Inc. 1979).

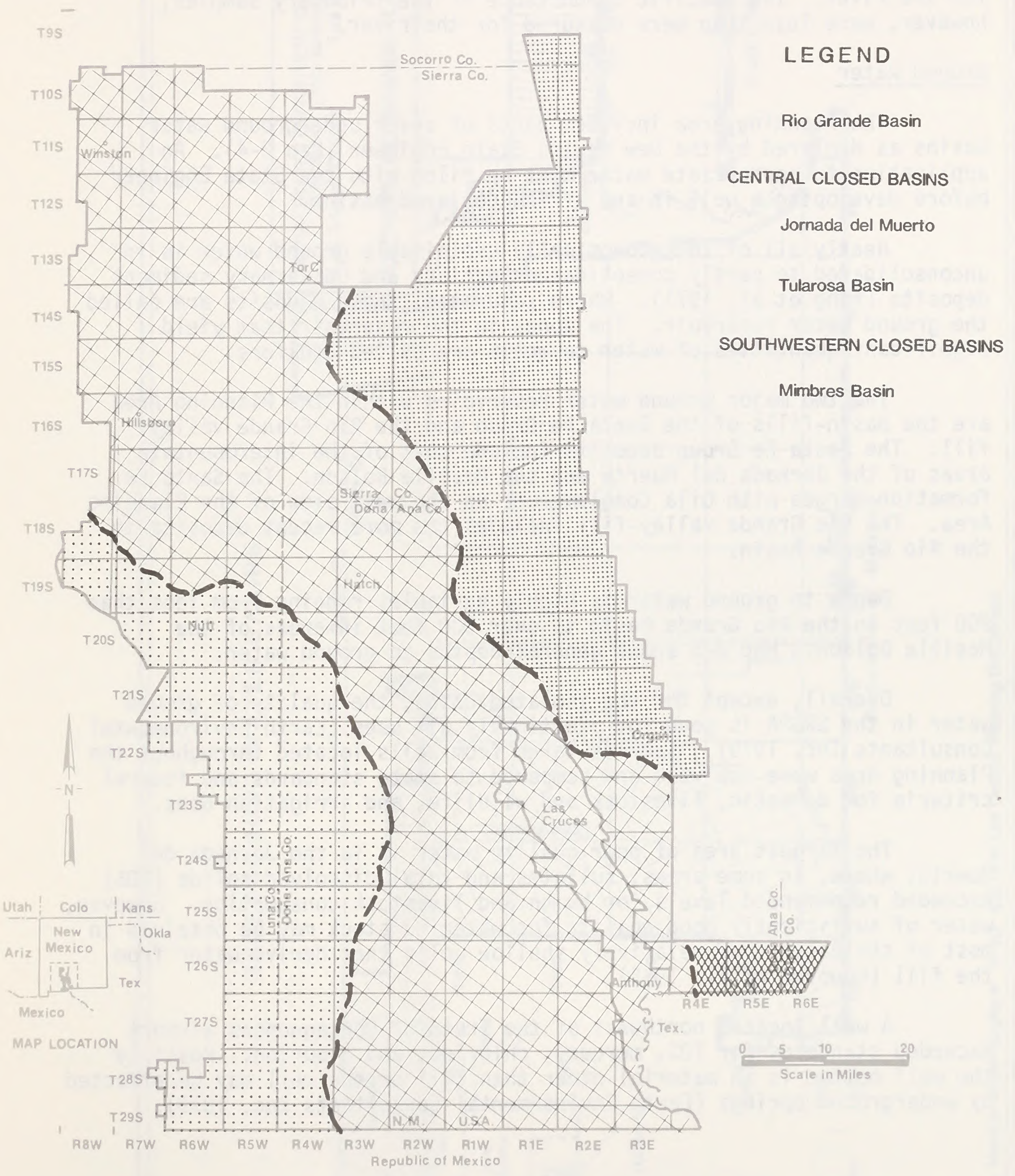
Eleven major floodwater retarding structures have been constructed on major ephemeral watersheds throughout the Planning Area. Most were the result of the Watershed Protection and Flood Prevention Act (Public Law 566) passed by Congress in 1954 which gave the Soil Conservation Service (SCS) authority to provide technical and financial assistance to local organizations in planning and carrying out the watershed projects. In addition to the major projects, 411 private, state, and federally-owned earthen reservoirs (with less than 10 acre-feet water capacity) have been constructed primarily for livestock and wildlife waters. The reservoirs contain water for varying lengths of time depending primarily on soil and watershed conditions.

Samples taken of flowing runoff water (in arroyos) and impounded water (in dirt tanks) were analyzed and found to conform with federal EPA criteria for livestock and wildlife waters and for use as irrigation waters (Earth Environmental Consultants Inc. 1979). Federal criteria

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA

SURFACE-WATER DRAINAGE BASINS



LEGEND

Rio Grande Basin

CENTRAL CLOSED BASINS

Jornada del Muerto

Tularosa Basin

SOUTHWESTERN CLOSED BASINS

Mimbres Basin

SOURCE: New Mexico State Engineer 1980 and BLM Las Cruces Planning Documents

MAP.2-3

and state standards are shown in Appendix F-1. When compared to the Rio Grande at San Marcial, or essentially where it enters the Planning Area, only the field pH of all flowing runoff water exceeded the pH measured for the river. The specific conductance of the tributary samples, however, were less than were measured for the river.

Ground Water

The Planning Area includes parts of seven underground water basins as declared by the New Mexico State Engineer (Map 2-4). An application to appropriate water must be filed with the State Engineer before developing a well in any of the declared basins.

Nearly all of the economically exploitable ground water is in unconsolidated to partly consolidated Tertiary and Quaternary sediment deposits (King et al. 1971). Where saturated, these deposits are called the ground water reservoir. The zones in the reservoir that yield significant quantities of water to wells are called aquifers.

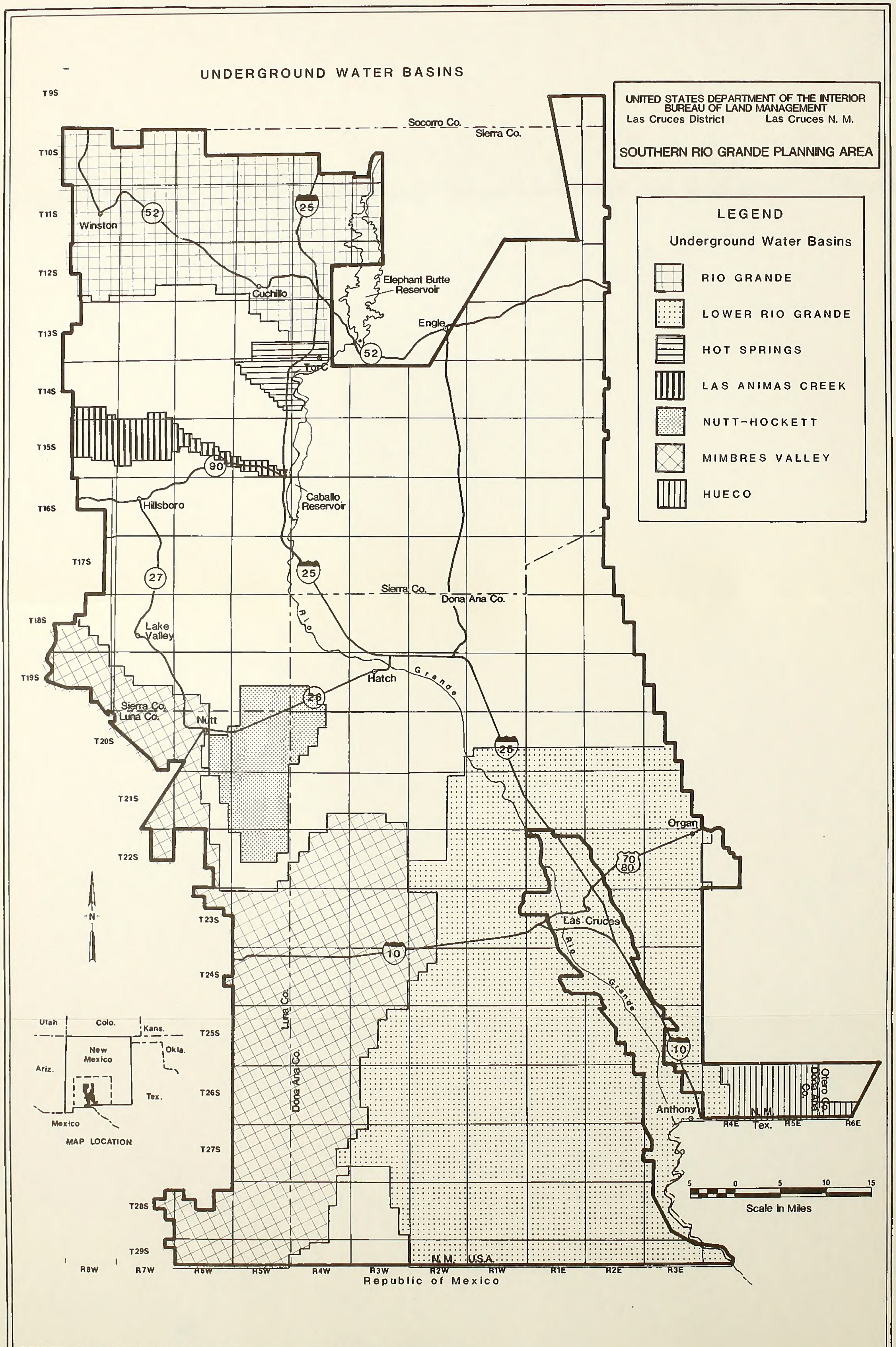
The two major ground water reservoirs within the Planning Area are the basin-fills of the Santa Fe Group and the Rio Grande valley-fill. The Santa Fe Group deposits include most of the intermountain areas of the Jornada del Muerto and the Mesilla Bolson. The Santa Fe formation merges with Gila Conglomerate on the west side of the Planning Area. The Rio Grande valley-fill includes the more recent deposits in the Rio Grande Basin.

Depth to ground water is highly variable, ranging from less than 200 feet in the Rio Grande Basin to over 500 feet in areas of the Mesilla Bolson. Map 2-5 shows general depths to ground water.

Overall, except for the isolated cases, the quality of ground water in the SRGPA is good for practically all uses (Earth Environmental Consultants Inc. 1979). Samples taken from wells located throughout the Planning Area were analyzed and compared to state standards and federal criteria for domestic, livestock and wildlife, and irrigation uses.

The largest area of poor quality water is in the Jornada del Muerto; where, in some areas, sulfates and total dissolved solids (TDS) exceeded recommended levels for human and livestock consumption. However, water of sufficiently good quality for watering stock may be obtained in most of the basin from relatively shallow wells that derive water from the fill (Conover et al. 1955).

A well located northwest of the Truth or Consequences airport exceeded standards for TDS, mercury, chloride, and flouride. Possibly the well bottom is in material other than fill or the well may be affected by underground springs (Earth Environmental Consultants Inc. 1979).



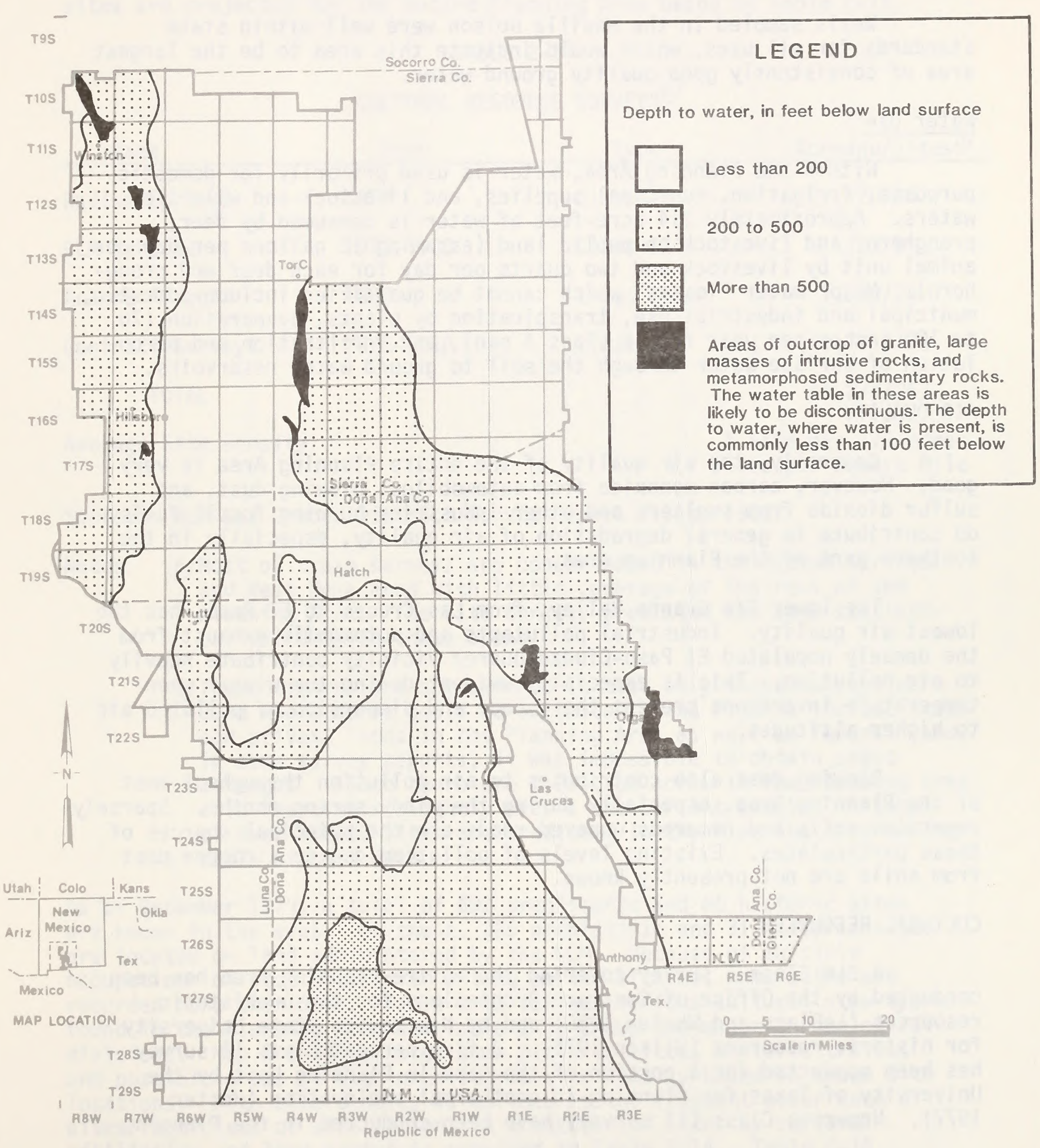
SOURCE: New Mexico State Engineer 1980 and BLM Las Cruces Planning Documents

MAP 2-4 Underground Water Basins

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA

GENERAL DEPTH TO GROUND WATER



SOURCE: Adapted From COOPER, 1971 and BLM Las Cruces Planning Documents

MAP.2-5

The only other parameters in excess of standards were TDS from a well in the northwest part of the Planning Area and flouride from a well in the Uvas Valley.

Wells sampled in the Mesilla Bolson were well within state standards for all uses, which would indicate this area to be the largest area of consistently good quality ground water.

Water Use

Within the Planning Area, water is used primarily for domestic purposes, irrigation, municipal supplies, and livestock and wildlife waters. Approximately 214 acre-feet of water is consumed by deer, pronghorn, and livestock on public land (assuming 12 gallons per day per animal unit by livestock and two quarts per day for each deer and pronghorn). Major water "losses" which cannot be quantified include domestic, municipal and industrial use, transpiration by plants, evaporation (70 to 100 inches per year from a Class A pan), and infiltration and percolation of surface water through the soil to ground water reservoirs.

AIR QUALITY

Generally, the air quality of the entire Planning Area is very good. However, carbon monoxide from automobiles, blowing dust, and sulfur dioxide from smelters and other industries burning fossil fuels, do contribute to general degradation of air quality, especially in the southern part of the Planning Area.

The lower Rio Grande Valley, from Las Cruces to El Paso, has the lowest air quality. Industrial pollutants and automobile exhaust from the densely populated El Paso-Ciudad Juarez vicinity contribute heavily to air pollution. This is especially evident during the winter when temperature inversions prevent the escape and dispersion of polluted air to higher altitudes.

Blowing dust also contributes to air pollution throughout most of the Planning Area, especially during the windy spring months. Sparsely vegetated soils and numerous unpaved roads are the principal sources of these particulates. Existing levels of pollution due to airborne dust from soils are not presently known.

CULTURAL RESOURCES

A BLM Class I survey covering the entire Planning Area has been conducted by the Office of Contract Archaeology for the prehistoric resources (LeBlanc and Whalen 1980) and by New Mexico State University for historic resources (Wilson 1975). A five percent Class II survey has been conducted for a portion of the Caballo Planning Unit by the University of Texas for planning in geothermal exploration (Hester 1977). Numerous Class III surveys have been conducted in the Planning

Area for various projects. Table 2-11 lists the results of the various surveys in the Planning Area indicating a little over one percent of the area has been surveyed, locating 257 sites. A total of over 16,000 sites are projected for the entire Planning Area based on Table 2-11.

TABLE 2-11

CULTURAL RESOURCE SURVEYS[a]

Name	Year	Type	Acreage/Sites[b]
Radium Springs	1977	Class II	21,120/96
BLM Inhouse	1975-1980	Class III	753/8
Anapra Airport	1980	Class III	1,700/24
Contract Surveys	1975-1980	Class III	20,701/129
TOTAL			44,274/257
Average Site Density			1 Site per 172 Acres 3.7 Sites per Square Mile

Source: BLM Las Cruces District Survey Report Files, 1980.

Notes: a/Most of these surveys are concentrated in the Radium Springs and West Mesa area with little coverage of the rest of the Planning Area. The site density predicted has some statistical validity in those areas.

b/These figures are approximate in that only those surveys were used where acres could be estimated. The figures include state and private lands in the Planning Area as well as federal land. In some survey reports, it was impossible to obtain exact acreages. Since there are 2,933,258 acres in the Planning Area, this represents slightly over a one percent sample. A total of over 16,000 sites are predicted in the Planning Area on the basis of this data.

As of December 1979, a total of 602 prehistoric and 85 historic sites are known in the area. Of these, 325 prehistoric and 31 historic sites are located on land administered by the BLM. Because of multiple occupations of some sites over a long period of time, some sites are recorded more than once. Table 2-12 defines various cultural site types found in the Planning Area and Table 2-13 shows the major chronological divisions. Map 2-6 illustrates some historic sites, historic trails, and possible areas of high prehistoric site density based on known site locations. High site density is defined as the frequent occurrence of sites regardless of affiliation. A breakdown of sites by cultural affiliation and land status is provided in Table 2-14. Table 2-15

TABLE 2-12

CULTURAL SITE TYPES

Type	Distinguishing Features	Period
Lithic Scatter	Area where flakes, cores, and stone tools are located either through the manufacture or use of the tools.	All Prehistoric
Quarry	An area containing materials used in the manufacture of stone tools. All steps in the manufacture of tools from natural rock to finished tools are present.	All Prehistoric
Pottery Scatter	Area where potsherds are concentrated, usually a small site.	Mogollon to Historic
Campsite	A temporary habitation area containing a lithic scatter, evidence of fire use, and usually ground stone and often a pottery scatter.	All Periods
Rock Shelter	An area protected by overhanging cliff. Often associated with the same materials as a campsite as well as rock art.	All Periods
Villages	A permanent habitation area containing several types of artifacts, evidence of agriculture and structures.	Mogollon to Historic
Rock Art (Petroglyph or Pictograph)	Incised figures such as people, animals, plants, or abstracts on a rock surface.	Archaic to Modern
Trails	Routes used for trade and migration.	Mogollon (?) to Historic
Mines	An excavation along with associated outbuildings for the extraction of mineral ore.	Historic
Ranches	A series of buildings associated with the livestock industry.	Historic

Source: BLM Las Cruces District EIS Team Files, 1980.

TABLE 2-13

CULTURAL PERIODS PRESENT IN THE PLANNING AREA

Period	Date[a/]
Paleo Indian	13,500 - 7,000 BC
Archaic	7,000 - 200 BC
Early Pithouse	200 - 550 AD
Late Pithouse	550 - 1000 AD
Mimbres	1000 - 1150 AD
Animas	1150 - 1300 AD
Salado	1375 - 1450 AD
Apachean	1600 - 1880 AD
Hispanic	1581 - Present
Anglo	1847 - Present

Source: Whalen and LeBlanc, 1980.

Notes: a/Many of these dates may be altered by further archaeological and historical studies.

TABLE 2-14

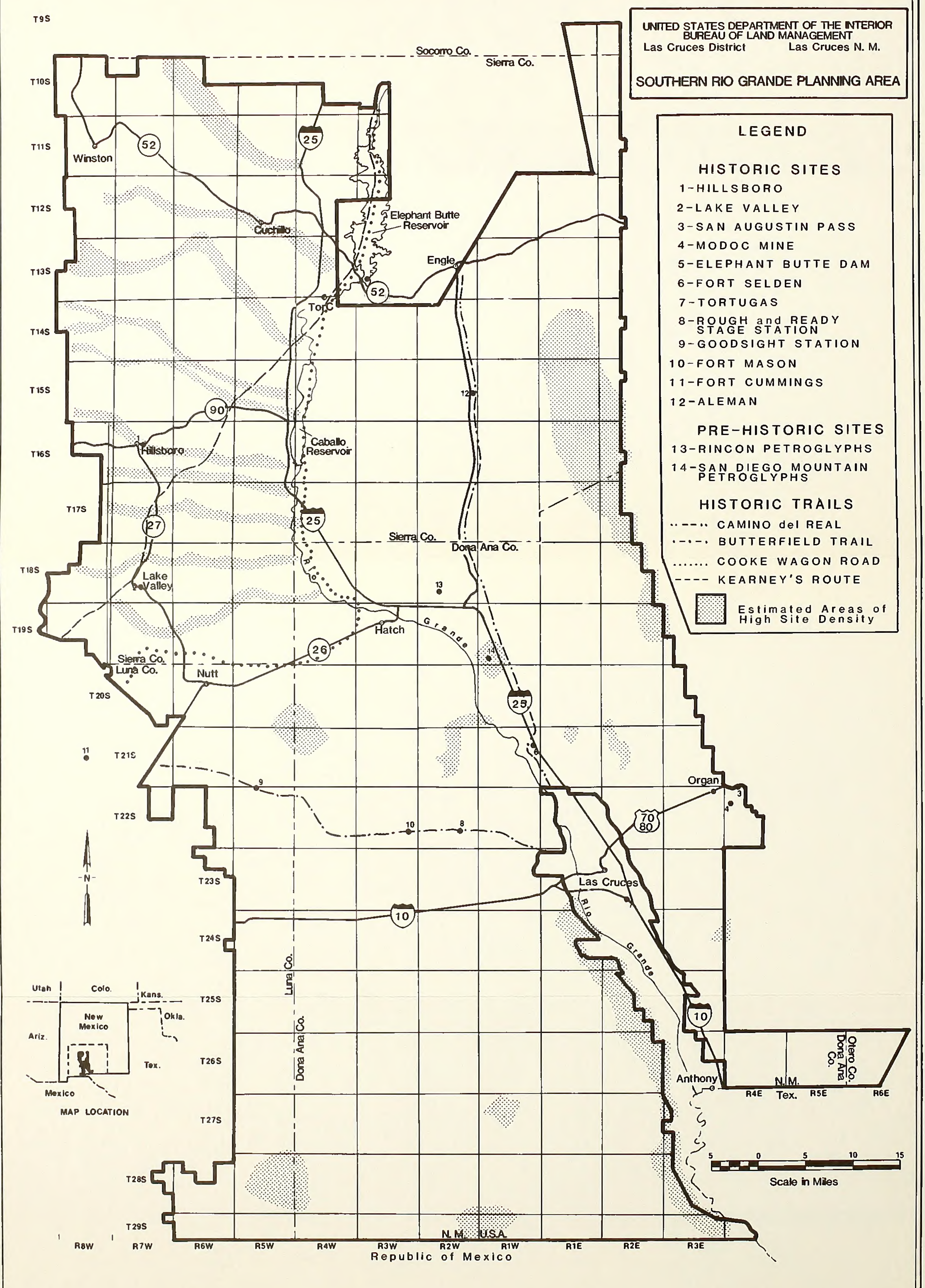
CULTURAL RESOURCE AFFILIATION IN THE PLANNING AREA (PA) BY PLANNING UNIT (PU)

Affiliation	Total Number of Sites in PA	Percent of all Sites in PU	Percent of Total Sites in PA	Number of BLM Administered Sites in PU	Percent of Administered Sites in PU	Percent of Total BLM Sites in PA	Percent of[b/] Total Sites in PA
Caballo							
Paleo Indian	3	1	-	2	-	1	-
Archaic	10	2	1	10	2	3	1
Pithouse (Mogollon)	46	11	7	15	8	4	2
Pueblo (Mogollon)	105	26	15	30	17	8	4
Indeterminate Mogollon	97	24	14	46	25	13	7
Historic Indian	7	2	1	6	3	2	1
Historic Non-Indian	50	12	7	13	7	4	2
Lithic Scatter - Undetermined Affiliation	86	21	13	57	31	16	8
Indeterminate	31	9	5	15	8	4	2
Multicomponent	31	8	5	12	6	3	2
Totals[a/]	408	100	59	181	100	51	26
Las Uvas							
Paleo Indian	1	-	-	1	-	-	-
Archaic	1	-	-	0	-	-	-
Pithouse (Mogollon)	20	9	3	12	5	3	2
Pueblo (Mogollon)	42	18	6	26	11	7	4
Indeterminate Mogollon	57	25	8	35	15	9	5
Historic Indian	1	-	-	1	-	-	-
Historic Non-Indian	18	8	3	7	3	2	1
Lithic Scatter - Undetermined Affiliation	81	35	12	55	24	15	8
Indeterminate	26	11	4	15	7	4	2
Multicomponent	17	7	2	7	3	2	1
Totals[a/]	230	100	33	145	100	41	21
Organ							
Paleo Indian	1	2	-	1	2	-	-
Archaic	0	-	-	0	-	-	-
Pithouse (Mogollon)	6	12	1	4	8	1	1
Pueblo (Mogollon)	9	18	1	2	4	1	-
Indeterminate Mogollon	10	20	1	6	12	2	1
Historic Indian	1	2	-	0	-	-	-
Historic Anglo Hispanic	8	3	1	4	8	1	1
Indeterminate	21	20	3	16	33	4	2
Multicomponent	7	14	1	3	6	1	-
Totals[a/]	49	100	7	30	100	8	4

Source: BLM Las Cruces District Office Planning Documents, 1980.

Notes: a/Because of the presence of multicomponent sites the totals for number of sites do not add up.
b/This column represents the percentage of BLM sites for each temporal affiliation compared with the total sites in the Planning Area.

CULTURAL RESOURCES



SOURCE: BLM Las Cruces District Files 1980

MAP 2-6 Cultural Resources

TABLE 2-15

CORRELATION BETWEEN SITE TYPE AND MAJOR VEGETATION TYPES IN THE PLANNING AREA

	MAJOR VEGETATION TYPES[a/]												
Type of Site	Grass	Creosote	Tarbush	Broom Dalea	Mesquite	Mixed Desert Shrub	Snakeweed	White Thorn	Sotol	Yucca	Juniper	Forbs	Sumac
Organ													
Paleo Indian									1				
Archaic													
Pithouse		1			1	2		1					
Pueblo		1		1	1	1	1	1					
Historic Indian						2							
Historic				1	1	4	1						
Rock Art		3				2							
Lithic Sites (age unk.)	1	3			2	3							
Ceramic Sites (age unk.)		3			2	3		1					
Unknown	2	1			1	2							
Las Uvas													
Paleo Indian					1								
Archaic						1							
Pithouse	4	7			4	1	1						1
Pueblo	2	10			20	1							1
Historic Indian					1								
Historic	3	4			5		1						
Rock Art	3	2				1							1
Lithic Sites (age unk.)	10	19			33	9				1	1	1	
Ceramic Sites (age unk.)	3	9			25	1	1						
Unknown		5			5	1							
Caballo													
Paleo Indian			1		1								
Archaic	1	2			2	2							
Pithouse	1	3	1		4	3					1		
Pueblo	3	19	1		10	13							
Historic Indian		1			3								
Historic	24	5			3	2	1				1	1	
Rock Art	2	5	1										
Lithic Sites (age unk.)	16	15	3		16	10	2						
Ceramic Sites (age unk.)	5	17	4		16	11							
Unknown		2	2		2	2							
Total													
Paleo Indian			1		2				1				
Archaic	1	2			2	3		1					
Pithouse	5	11	1		9	9	1	1			1		1
Pueblo	5	30	1	1	31	15	1	1					1
Historic Indian		1			4	2							
Historic	27	9			9	6	3				1	1	
Rock Art	5	10	1			3							1
Lithic Sites (age unk.)	27	37	3		51	22	2			1	1	1	
Ceramic Sites (age unk.)	9	29	4		43	15		1					
Unknown	5	8	2		8	5							
Grand Total	84	137	13	1	159	80	8	4	1	1	3	2	3

PERCENT OF CULTURAL SITES WITHIN MAJOR VEGETATION TYPES IN THE PLANNING AREA

Major Vegetation Types[b/]	Grass 14%	Creosote 41%	Tarbush 2%	Broom Dalea 3%	Mesquite 24%	Mixed Desert Shrub 7%	Snakeweed 5%	White Thorn 1%	Sotol 4%	Yucca 1%	Juniper 5%	Forbs 2%	Sumac 1%
Cultural Sites[c/]													
Total													
Paleo Indian													
Archaic						1%							
Pithouse	1%	2%			2%	2%							
Pueblo	1%	6%			6%	3%							
Historic Indian					1%								
Historic	5%	2%			2%	1%	1%						
Rock Art	1%	2%				1%							
Lithic Sites (age unk.)	5%	7%	1%		10%	4%							
Ceramic Sites (age unk.)	2%	6%	1%		9%	3%							
Unknown	1%	2%			2%	1%							
Grand Total[d/]	17%	28%	3%		32%	16%	2%	1%			1%		1%

Source: BLM Las Cruces District Planning Documents, 1980.

Notes: a/Vegetation does not seem to be a deciding factor in the location of some sites such as rock art and most historic sites. Many sites were located in areas that had not been vegetatively classified, the Caballo PU had the largest number of sites in unclassified areas. A scientifically designed stratified random sample taking into account environmental factors would likely reveal significant differences from these results.

b/The figures represent the percentage of each type of vegetation on public land in the Planning Area.

c/The percentage is computed against all sites (496) in the Planning Area.

d/Most of these totals do not add up because of rounding.

correlates known cultural sites with the major vegetation categories in the Planning Area. This table indicates that the majority of the sites have been recorded in the mid-grass, creosote, mesquite, and mixed desert shrub vegetation types. The physical condition of the sites in the Planning Area is tabulated in Table 2-16, indicating that most site conditions are unknown while the majority of the site conditions that are known are in fair to poor condition.

TABLE 2-16

PHYSICAL CONDITION OF CULTURAL SITES IN THE PLANNING AREA[a]

Planning Unit	Good	Fair	Poor	Destroyed	No Information
Organ	3	11	12	5	19
Las Uvas	3	71	30	1	125
Caballo	21	128	59	4	172
Total	27	210	101	10	316

Source: BLM Las Cruces District Office Planning Documents, 1980.

Notes: a/Because much of this data was recorded before the 1970's the conditions of many of these sites has probably changed for the worse. Since the table includes all recorded sites in the Planning Area, many sites on private land in the Rio Grande Valley have probably been destroyed since they were recorded. Sites on BLM land are probably less affected by construction and agricultural land clearance than those on private land; therefore, they may be in somewhat better condition except near areas of high population density.

With a total of 664 sites recorded in the Las Cruces District, 4 percent are in good condition, 32 percent are in fair condition, 15 percent are in poor condition, and 2 percent are destroyed (See Table 2-16). The condition of 48 percent of the sites cannot be determined with the data available. No overall statistically valid predictions of prehistoric site location, density, and condition can be made, because of the clustering of the existing surveys in two portions of the Planning Area and the small sample size.

A formal consultation with the New Mexico State Historic Preservation Officer on December 17, 1979 concerning the eligibility of the sites in the Planning Area for National Register consideration and their significance revealed that few sites had enough documentation to make such a determination. There are eight sites in Dona Ana and Sierra Counties (Table 2-17) that are listed on the National Register of Historic Places (Federal Register, Vol. 44, No. 26, February 6, 1979; Vol. 45, No. 54, Tuesday, March 18, 1980; all subsequent volumes with a New Mexico listing).

TABLE 2-17

SITES IN DONA ANA AND SIERRA COUNTIES LISTED ON[a/] THE NATIONAL REGISTER OF HISTORIC PLACES

Dona Ana	Sierra County
International Boundary Marker #1	Percha Diversion Dam
Armijo, Nestor House	Elephant Butte Dam and Reservoir
Fort Fillmore	
Fort Seldon	
Mesilla Plaza	
Barela-Reynolds House	

Source: Federal Register, 1979 and 1980.

Notes: a/None of the sites are on BLM administered land.

VISUAL RESOURCES

In the inventory of the visual resources of the SRGPA BLM identified one potential Area of Critical Environmental Concern (ACEC) for visual resources and developed tentative Visual Resource Management (VRM) classes.

The VRM class assigned to an area depends on three factors:

1. the inherent quality of the scenery;

2. the visual sensitivity which expresses the volume of viewers and their attitudes toward changes in the scenery;

3. the distance zones from which the scenery is being viewed.

A thorough discussion of the inventory and evaluation process is presented in Appendix G-1. In addition to the inventory data, the VRM classes can reflect management considerations. Each Wilderness Study Area (WSA), for example, is managed as a VRM Class II area.

Each VRM class describes a different degree of modification allowed in the basic elements of a landscape. For each class the primary character of the landscape should be retained regardless of the degree of modification. The following are the minimum management objectives for each class.

ACEC - The ACEC for scenic values consists of a landscape with high scenic values of relative scarcity. Management of the area will protect the visual quality of the landscape.

Class II - Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the landscape. A contrast may be seen but should not attract attention.

Class III - Contrasts to the basic elements caused by a management activity may be evident and begin to attract attention in the landscape. The changes, however, should remain subordinate in the existing landscape.

Class IV - Contrasts may attract attention and be a dominant feature in the landscape in terms of scale. However, the changes should repeat the basic elements of the landscape.

Map 2-7 illustrates the location of the proposed ACEC and the tentative VRM classes and approximate acreages in each class.

WILDERNESS

The Federal Land Policy and Management Act (FLPMA) of 1976 mandated the BLM to examine the wilderness potential of certain areas of public land. The wilderness review provision of FLPMA, Section 603, directs the BLM to conduct an inventory to identify all roadless areas of 5,000 acres or more that have wilderness characteristics. Once the areas have been identified, they will be studied through BLM's planning system to determine whether each is suitable for preservation as wilderness or is more suitable for other uses. The findings of these studies lead to recommendations through the Secretary of the Interior and the President to Congress. The Secretary will report his recommendations by October 21, 1991. The President will report to Congress on all areas by October 21, 1993. Only Congress has the authority to designate public land as wilderness.

As a result of the wilderness inventory, BLM has identified the following seven Wilderness Study Areas (WSAs) in the SRGPA.

West Potrillo Mountains (NM-030-052) 143,145 Acres
The West Potrillo Mountains are a north-south trending series of low volcanic cinder cones. The topography consists of undulating cones interspersed with gently rolling to flat valleys. Maximum relief is approximately 1,000 feet. Vegetation is sparse and ranges from creosote-mesquite to desert shrub-grass types as the elevation increases.

Mount Riley (NM-030-052c) 7,400 Acres
Mount Riley is a peak located along the eastern edge of the West Potrillo Mountains WSA. The peak rises to 5,915 feet. Vegetation is primarily shrub-grass types.

Aden Lava Flow (NM-030-053) 24,725 Acres
The majority of the Aden Lava Flow consists of a basaltic pressure ridge, sinks, spatter cones and other depressions typical of lava flow physiography. The south-eastern portion of the unit is characterized by flat, sedimented lava features with little vegetation other than grasses and small shrubs.

Robledo Mountains (NM-030-063) 11,640 Acres
The Robledo Mountains, overlooking the Rio Grande, are a small chain of rugged volcanic mountains. Vegetation consists of grass associations in the mountainous terrain and creosote in the flat lands.

Las Uvas Mountains (NM-030-065) 10,680 Acres
The Las Uvas Mountains are composed of tilted volcanic rock with a gentle slope on the western side and cliffs on the east. Vegetation varies from desert shrubs, yucca, and creosote at the lower elevations to juniper and grasses at the higher elevations.

Organ Mountains (NM-030-074) 7,200 Acres
This area contains the northern Organ Mountains and the bordering alluvial fan. The range consists of rugged rock outcrops and massive spires and pinnacles. The vegetation encompasses four life zones; the Lower and Upper Sonoran, Transition, and Canadian. Cacti, grasses, sotol, yucca, oak, pine, spruce and juniper are among the approximately 800 plant species that occur in the area.

Jornada Lava Flow (NM-030-081) 28,918 Total Acres (3,659 acres in the Las Cruces District)
The area is composed of the eastern third of the Jornada Lava Flow, an old rugged volcanic area. Elevation ranges from 4,740 feet to 4,940 feet. Vegetation is dominated by grasses and shrubs.

Map 2-8 illustrates each area's location. WSAs are subject to change pending the outcome of the protest and appeals period. Currently the total WSA acreage within the Southern Rio Grande Planning Area is 208,449 acres. (For more detail on each WSA, see New Mexico Wilderness Study Area Decisions, November 1980.)

BLM will manage WSAs in a manner that maintains the area's suitability for preservation as wilderness (A discussion of BLM's management policy is found in the Interim Management Policy and Guidelines for Lands Under Wilderness Review, 1976.)

RECREATION

The SRGPA contains a wide variety of recreational opportunities. These opportunities occur in two categories, dispersed and developed.

Dispersed recreational opportunities are independent of recreational developments. These activities usually occur in natural or rural settings. Contact with other recreational groups are usually low on trails and away from roads. This type of recreation use accounted for approximately 76,200 visitor days in 1980, approximately 54 percent of the recreational use of the Planning Area. The most popular activities were camping/picnicking (35,463 visitor days) and off-road vehicle use (16,777 visitor days) (Southern Rio Grande Planning Area Analysis, 1979). Deer hunters are spending approximately 2,800 visitor days per year in the SRGPA. This figure is determined through the hunter days spent per deer harvest, projected kill, percent of public land within the herd unit, and the percent of hunter pressure on public land (New Mexico Department of Game and Fish, 1978). (See Appendix I for methodology.) Pronghorn hunting is permitted within the White Sands herd unit. Currently about 80 permits are being issued for pronghorn. About 28 of these permits and approximately 59 visitor days are attributed to public land.

Other popular forms of dispersed recreation are hiking, shooting, and rock and mineral collection. The majority of this use is occurring in the southern half of the Planning Area on the public land around Las Cruces and El Paso. Maps 2-9 and 2-10 illustrate the locations of some of these dispersed use areas.

The Aguirre Spring Recreation Area and the Organ Mountain Recreation Lands provide an additional 65,000 visitor days per year. This area is currently the only developed BLM recreation site in the Planning Area. Major activities at Aguirre Spring and in the recreation lands are picnicking, camping, hiking, sightseeing, and rock climbing.

Three areas in the Planning Area have been proposed for recreational development. Campgrounds, picnic facilities and hiking trails are proposed for the Dona Ana Mountains and Kilbourne Hole. Soledad Ecology Garden (within the Organ Mountains) has been recommended for development as an interpretive area. The location of these proposed developments is shown on Map 2-9.

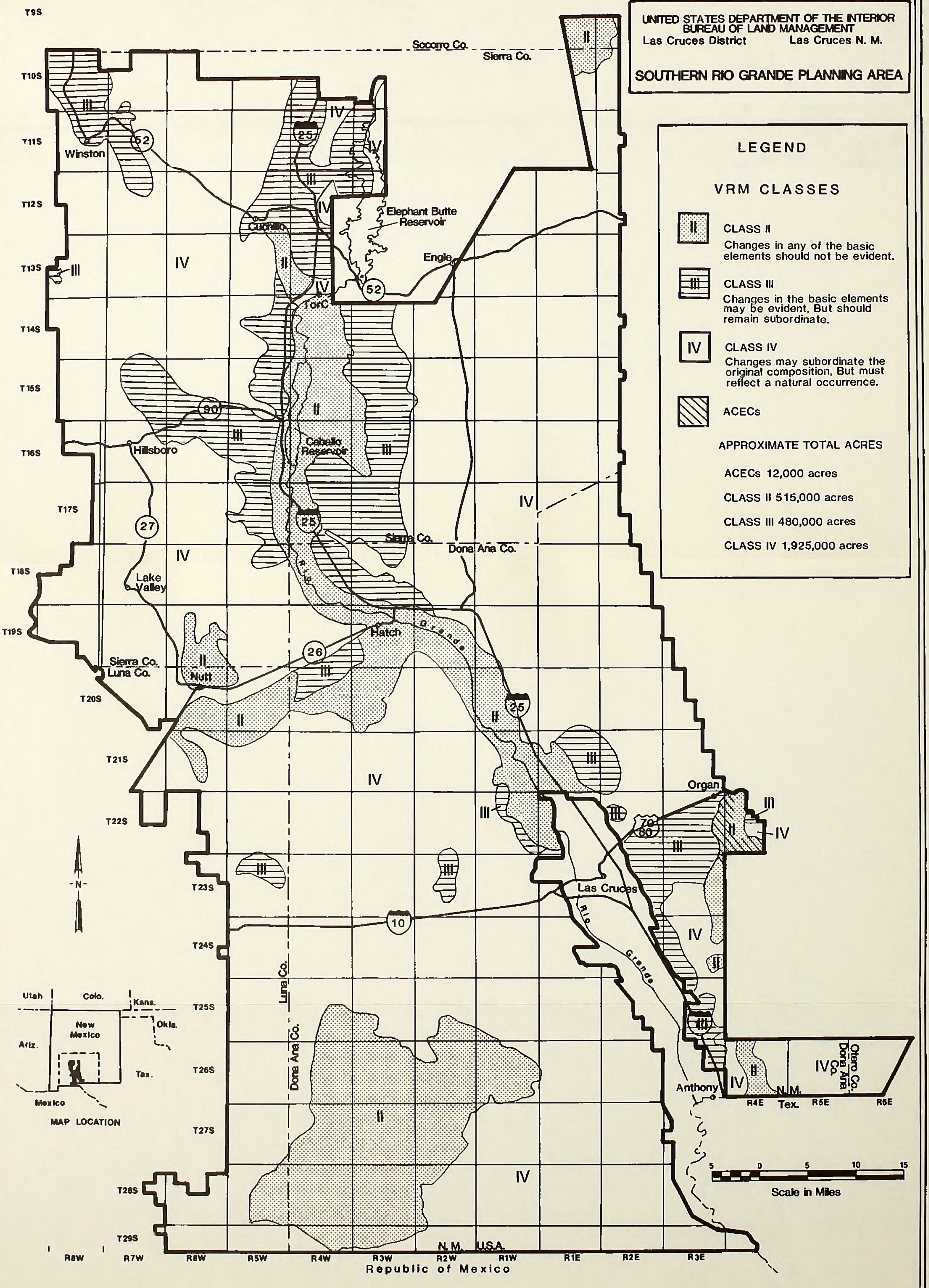
AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

The Federal Land Policy and Management Act (FLPMA) of 1976 mandated the BLM to identify and protect public land which contain significant natural or cultural resource values. The Congress defined these "Areas of Critical Environmental Concern" as areas:

> "within the public land where special management attention is needed to protect and prevent irreparable damage to important historical, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards."

The BLM has identified one potential ACEC in the SRGPA (Map 2-7). The proposed area, the Organ Mountains is identified because of its outstanding visual quality and its relative scarcity. Special attention

VISUAL RESOURCE MANAGEMENT CLASSES and ACECs



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N. M.

SOUTHERN RIO GRANDE PLANNING AREA

LEGEND

VRM CLASSES

II	CLASS II Changes in any of the basic elements should not be evident.
III	CLASS III Changes in the basic elements may be evident, But should remain subordinate.
IV	CLASS IV Changes may subordinate the original composition, But must reflect a natural occurrence.
▨	ACECs

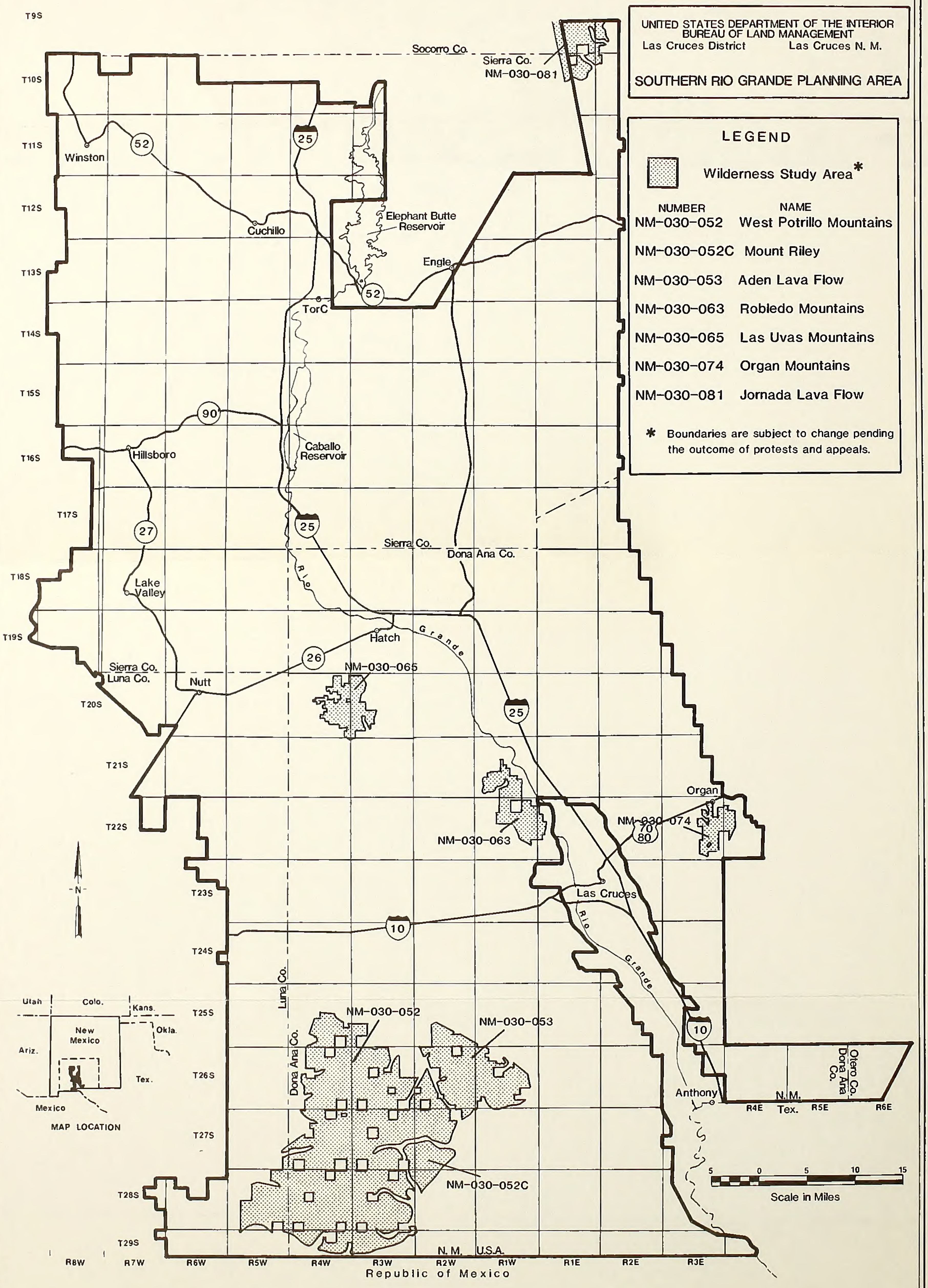
APPROXIMATE TOTAL ACRES

ACECs	12,000 acres
CLASS II	515,000 acres
CLASS III	480,000 acres
CLASS IV	1,925,000 acres

SOURCE: BLM Las Cruces District Files 1980

MAP.2-7 Visual Resource Management Classes and ACECs

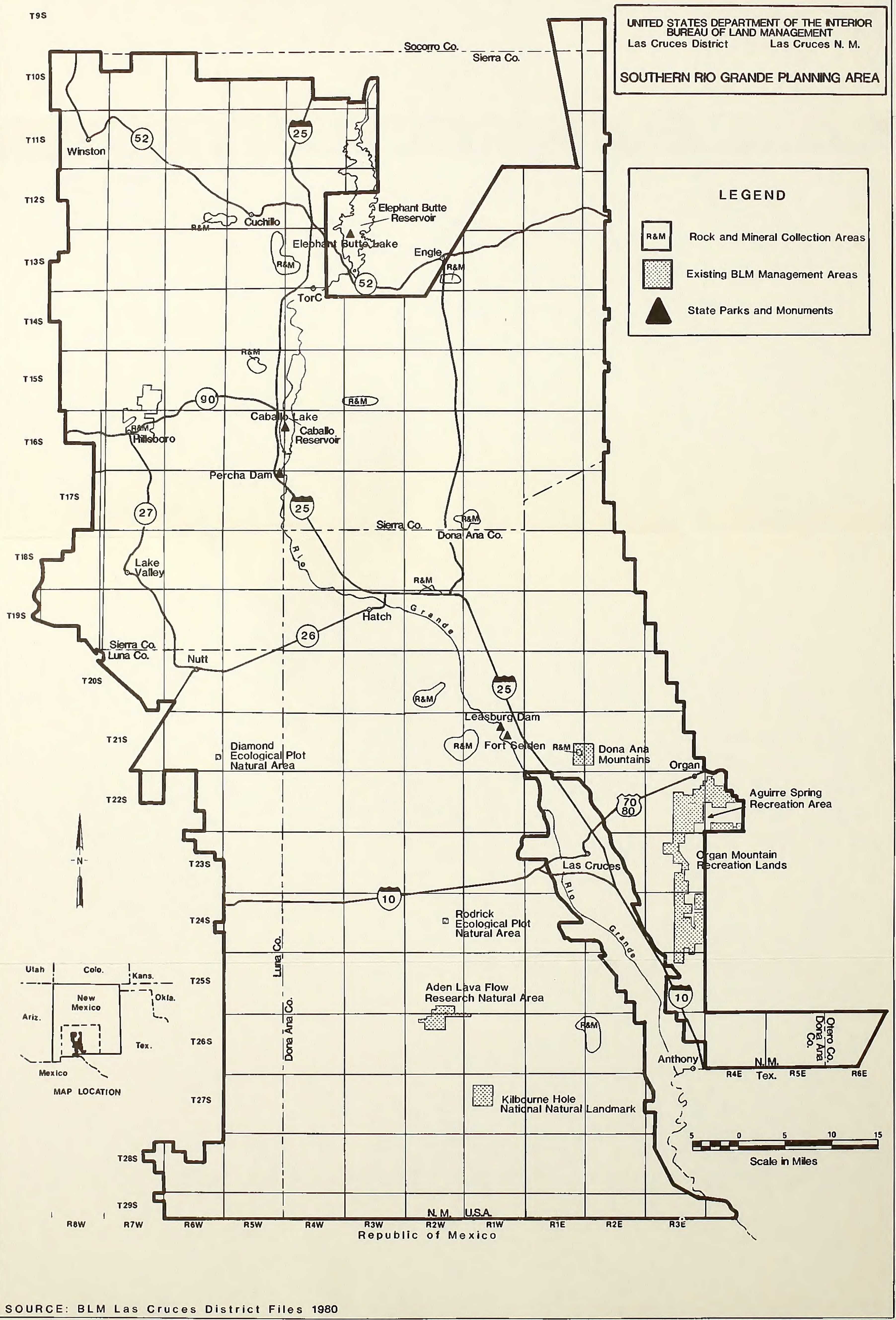
WILDERNESS STUDY AREAS



SOURCE: BLM Las Cruces District Files 1980

MAP 2-8 Wilderness Study Areas

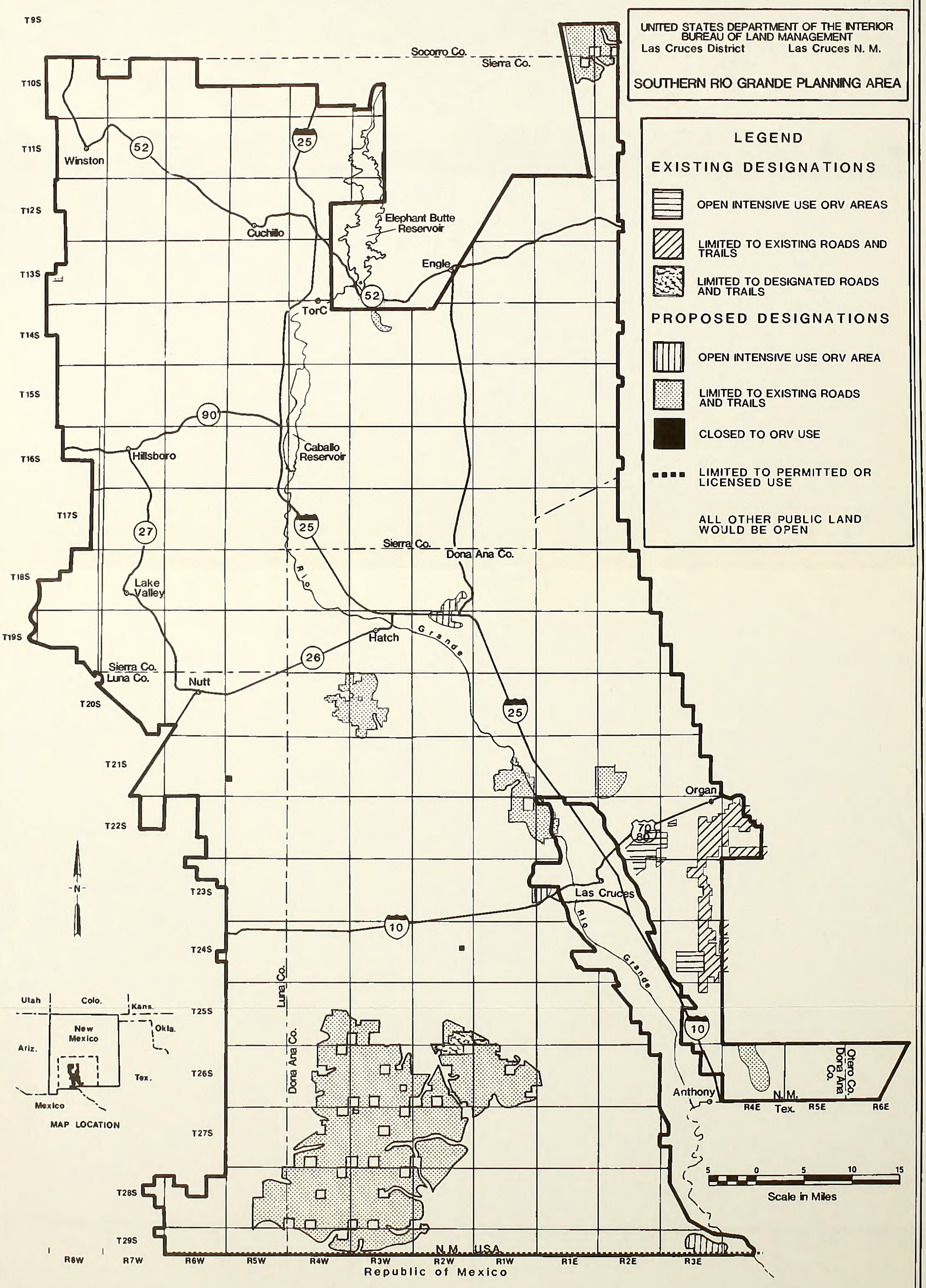
NATURAL AREAS, NATIONAL LANDMARKS and RECREATION AREAS



SOURCE: BLM Las Cruces District Files 1980

MAP 2-9 Natural Areas, National Landmarks and Recreation Areas

OFF ROAD VEHICLE (ORV) DESIGNATIONS



SOURCE: BLM Las Cruces District Files 1980

MAP 2-10 Off Road Vehicle (ORV) DESIGNATIONS

is required to protect or prevent irreparable damage to the outstanding scenic values. The Organ Mountains are characterized by a palisade of massive, jagged granite peaks whose bare rock caps rise many hundreds and often a thousand feet from the brush covered lower slopes. The mountains visually dominate the landscape within a 25 to 30 mile radius, with highest elevations more than a mile above the adjacent valley bottom. It forms the backdrop for the City of Las Cruces. In addition to their visual significance, the mountains provide many recreational opportunities. If the Organ Mountains are designated as a visual ACEC, a management plan will be written. (For more detail of the ACEC process, see Areas of Critical Environmental Concern Policy and Procedures Guidelines, 1980.)

OTHER LAND USES

The public land managed by BLM in the Planning Area is used principally for grazing, but a variety of other land uses also take place, including recreation (off-road vehicle use, hunting, hiking, sightseeing, and rock collecting), rights-of-way (communication sites, major pipelines for petroleum products, electric powerlines of all sizes, and roadways of all sizes), leases (R&PP leases for sanitary landfills and recreation sites), mineral production (metallic, non-metallic, and mineral materials), research (New Mexico State University and NASA), national defense, and other minor uses.

Generally the land within the Planning Area, but outside of the grazing allotments, is used for cropping, the Rio Grande Project (Elephant Butte and Caballo Lakes, the Rio Grande, irrigation canals and other facilities and flood control structures), rural residency, rights-of-way, and urban purposes.

Transportation

Access to the Planning Area is principally via Interstates 10 and 25, U.S. 70, NM-26, NM-27, NM-90, NM-52, numerous county roads, and ranch trails. Traffic on the interstates is very heavy with vehicles just "passing through"; local traffic is only a minor part of the total traffic count. Interstate 10 is the nation's major "snow free" southern route to the west coast. The Santa Fe and Southern Pacific railroads cross the area on their routes to the Pacific. The railroads carry heavy freight traffic through the Planning Area. Roads for railroad maintenance are located on railroad rights-of-way in some locations. Although they are not public roads, they are usually open to public use.

Physical access to the Planning Area is generally adequate. Legal access has not been a serious problem up to now, but the potential exists for future public access problems where non-public roads (such as ranch trail roads, which are not designated for public use by the county) cross private or state lands. There have been no access problems identified by the Unit Resource Analysis (URA) for the Planning Area. Access to federal minerals under private surface causes recurrent friction between landowners and mining interests. The mining laws provide for access by patent reservations.

Remote access roads are generally passable by two-wheel drive pickups, but a four-wheel drive vehicle is advisable in a few locations. Weather conditions only rarely limit access. Roads are adequately maintained by the counties in most of the Planning Area.

SOCIAL AND ECONOMIC CONDITIONS

Economic Conditions

The SRGPA includes parts of five counties in southwestern New Mexico. Two of these counties, Otero and Socorro, lie largely outside the Planning Area, as shown in Map 1-1. The bulk of the area's acreage and more than 90 percent of the grazing permittees holding allotments in the area reside in the three other counties--Dona Ana, Luna, and Sierra. For this reason, demographic, economic, and social conditions in the Planning Area are described below on the basis of data for the Three-County Area. Specific comparable data for the Planning Area are not available, except as a result of special data collection undertaken by Harbridge House, Inc., in limited interviewing efforts during 1978 and 1980.

In 1980, the Three-County Area had an estimated population of 120,095 persons. As shown in Table 2-18, four out of every five inhabitants of the area lived in Dona Ana County.

TABLE 2-18

POPULATION, THREE-COUNTY AREA, 1950-1980

County	1950a/	1960a/	1970a/	1979b/	1980c/
Dona Ana	39,600	60,100	69,900	90,300	95,995
Luna	8,800	9,800	11,700	14,500	15,653
Sierra	7,000	6,400	7,200	8,700	8,447
Three-Counties	55,400	76,300	88,800	113,500	120,095

Sources: a/U.S. Department of Commerce, Bureau of the Census, 1952 and 1973.

b/University of New Mexico, Bureau of Economic and Business Research, 1980.

c/U.S. Department of Commerce, Bureau of the Census, 1981.

Luna County represented 13 percent of the total population. Sierra County had 7 percent of all residents of the Three-County Area. Overall, the region has been growing rapidly. In the three decades after 1950, the area's population more than doubled for a total increase of 64,695. The effective growth rate for the population of the Three-County Area exceeded 2.5 percent annually. The number of inhabitants grew more rapidly in Dona Ana County, where the average population increase in each year between 1950 and 1980 was 1,875 persons for an effective annual rate of growth of nearly 3 percent.

This population growth in Dona Ana County has been concentrated in the City of Las Cruces, its suburbs, and an urbanizing corridor stretching from just north of Las Cruces to El Paso, Texas (just outside the Planning Area to the south). This corridor is parallel to the Pan American Highway and the Rio Grande. The largest community in the corridor and Dona Ana's county seat is Las Cruces, with a 1980 population of 44,916 within the city limits. The city made up 46.9 percent of the county's population and 37.4 percent of the population of the Three-County Area. Its suburbs include Dona Ana, La Mesilla, Mesilla Park, and University Park. Other communities in the corridor include Anapra-Sunland Park, Anthony, Chamberino, La Mesa, and Mesquite.

The estimated combined population of all the communities in this urbanizing corridor was approximately 78,650 persons. Since 1970, the growth of this corridor population has proceeded at a rate of more than 2.8 percent a year. In October 1979, Las Cruces and Dona Ana County were together designated a Standard Metropolitan Statistical Area (SMSA) by the U.S. Department of Commerce, Bureau of the Census. Special census data indicate that most increases in population are occurring in unincorporated locations on the periphery of established communities. One consequence of this growth is the division of agricultural lands by roads, utility lines, and water mains, and the actual displacement of farming and ranching from an increasing percentage of the corridor area.

Outside the urbanizing corridor in southern Dona Ana County, populations are smaller, more dispersed, and slower growing. There are three other major urban concentrations. The Village of Hatch in northern Dona Ana County had 1,027 inhabitants in 1980, a total which was approximately 18.5 percent higher than in 1970. The City of Deming (Luna County's seat) had a 1980 population of 10,038 which constituted an increase of 1,695 persons in the previous decade. The City of Truth or Consequences (Sierra County Seat) had 5,223 residents in 1980; the adjoining Village of Williamsburg had an additional population of nearly 443. Together with the El Paso-Las Cruces Corridor, these urban concentrations had a total of 95,381 inhabitants or 79.5 percent of the population of the Three-County Area.

Despite the growth in these communities, most of the Three-County Area is sparsely populated. The number of inhabitants per square mile of area was 10.6 in 1980, 10 percent greater than the average for

New Mexico as a whole but less than one-fifth of the national average. Outside of major population concentrations, there are large areas with fewer than one resident per square mile. The populations of these rural portions of the Three-County Area declined steadily from 1950 to the mid-1970's. Between 1975 and 1980, however, this decline apparently abated. All rural census county divisions showed increases in population between 1970 and 1980. Some rural communities showed particular growth. Retirees and other individuals seeking an independent lifestyle with proximity to outdoor recreation began to repopulate old mining towns like Hillsboro, Monticello, and Winston.

The Planning Area encompasses 198 grazing allotments as described in Chapter 1. These allotments are used by permittees in connection with an estimated 153 ranch operations. Approximately 12 of these operations are headquartered outside the Three-County Area and at least five have 40 percent or more of their total ranching operation located outside the Planning Area. A few ranch operations are run in association with much larger feedlot businesses. Overall, however, livestock ranches with grazing in the Planning Area are made up of cow-calf operations wholly or largely tied to use of local pasture and rangeland. In 1980, an estimated 785 persons were directly tied to these ranch operations, either because they themselves were employed there or because they were members of families whose income derived at least in part from operating these ranches.

Of this total population directly involved with ranching in the Planning Area, 35.1 percent lived in Dona Ana County, 14.3 percent lived in Luna County, and 42.2 percent lived in Sierra County. The remaining 8.4 percent resided outside the Three-County Area, with the largest concentration being in El Paso. The distribution of this ranching population varies significantly from the distribution of the total population in the region. The proportion of the population directly involved with ranching on public land is low in Dona Ana County and high in Sierra County. Whereas the City of Las Cruces accounts for 37.4 percent of the regional population, it represents less than 6.5 percent of the ranching population; and while urban population centers comprised 79.5 percent of all residents of the Three-County Area, they were home to only 46.1 percent of ranching family members.

The ranching population is predominantly rural and widely dispersed across the Planning Area. As with the rural population, the number and size of families of ranch operators and workers have been declining since 1950. This decline directly reflects the diminishing number of livestock ranches. Periodic drought, low prices for beef cattle, and rising costs of energy and materials have contributed to this decline, together with the natural aging of ranch operators and the frequent reluctance of younger family members to persist in ranching. As a result, ranch families have become increasingly dependent on non-ranch sources of employment and income. Many have moved closer to these sources and away from their ranches; some continue to run livestock solely as a hobby or for recreation. These members of the ranching population identify themselves as ranchers for attitudinal, rather than economic, grounds or reasons.

In 1980, an estimated 39,325 residents of the Three-County Area were employed on a regular basis. Approximately 4,245 persons were employed directly in agriculture. As shown in Table 2-19, the most important sources of employment in the region were the government, trade, and services sectors.

TABLE 2-19

EMPLOYMENT, THREE-COUNTY AREA, 1980

Sector	Dona Ana County	Luna County	Sierra County	Three-County Area
Agriculture	3,160	645	440	4,245
Range Livestock Production[a/]	80	33	97	210
Manufacturing	1,515	475	10	2,000
Mining	75	35	80	190
Construction	1,480	150	80	1,710
Transportation, Communications, & Public Utilities	1,225	290	110	1,625
Trade	5,640	1,045	410	7,095
Finance, Insurance, & Real Estate	870	175	100	1,145
Services	4,000	440	345	4,785
Government	14,335	1,245	950	16,530
Total	32,300	4,500	2,525	39,325

Source: New Mexico Employment Security Commission, 1980.

U.S. Department of Commerce, Bureau of Economic Analysis, 1980.

Note: a/Production for ranch units grazing in Planning Area only. These figures are not reflected in the total.

Total labor and proprietors income in 1980 was estimated to be $611,165. Agriculture contributed approximately $51,075,000 to this total. Its contribution was dwarfed by the three predominant sectors as shown in Table 2-20. Recent growth in the regional economy has been concentrated in non-agricultural sectors. Farm employment and income have fluctuated sharply on a year-to-year basis often experiencing declines. By contrast, the other basic industries of the region (military and aerospace testing and research, education, health care, recreation, and tourism) have expanded steadily.

TABLE 2-20

PERSONAL INCOME, THREE-COUNTY AREA, 1980
(in thousands of 1980 dollars)

Sector	Dona Ana County	Luna County	Sierra County	Three-County Area
Agriculture	$ 40,385	$ 6,465	$ 4,225	$ 51,075
Ranch Livestock Production[a]/	1,029	424	1,247	2,700
Manufacturing	53,690	5,140	120	58,950
Mining	300	1,000	700	2,000
Construction	41,740	2,950	2,820	47,510
Transportation, Communications, & Public Utilities	24,995	7,600	2,890	35,485
Trade	54,750	14,000	3,380	72,130
Finance, Insurance, & Real Estate	21,715	2,365	1,130	25,210
Services	64,910	6,075	4,205	75,190
Government	214,495	17,315	11,805	243,615
Total	$518,009	$63,334	$32,522	$611,165

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1980.

Note: a/Production for ranch units grazing in Planning Area only. These figures are not reflected in the total.

In 1980, livestock ranches using public land in the Planning Area employed approximately 210 persons on a full-time (or equivalent) basis. This employment figure does not include labor contributed to ranch operations by spouses and dependents and is an average which does not reflect the extreme variation in seasonal activity. Persons employed on ranches in the Planning Area represented less than 4.9 percent of total agricultural employment in the Three-County Area. Similarly, these ranches contributed an estimated $2.7 million to personal income, which constituted less than 5.3 percent of agricultural income. In terms of total regional employment and personal income, the direct contribution of ranching on public land is relatively slight, 0.5 percent of all jobs and 0.4 percent of all earnings.

Ranching has traditionally been an important economic activity in the Three-County Area, but its relative importance has been diminished sharply over the past three decades. The emergence of new basic industries centered upon defense, science, and education has focused economic growth on major population centers which are near facilities like the White Sands Missile Range, the Johnson Space Center, and New Mexico State University. In a few instances, these facilities have displaced ranching operations. In most instances, they have simply attracted capital and labor away from livestock ranching and created pressures for conversion of pasture and rangeland to more intensive uses, especially near Las Cruces and other growing communities. As one New Mexico report concluded, the beef industry "has had a marked decline when compared to the state's other major sectors" (Reuta and Zink 1978).

At present, ranching in the Planning Area is generally not profitable in business terms. Except for the largest ranches, operators can barely cover their operating costs. Typical ranch budgets are shown for four sizes of cow-calf operations in Table 2-21.

TABLE 2-21

BUDGETS FOR TYPICAL CATTLE RANCHES WITH ALLOTMENTS IN THE PLANNING AREA, 1980

Budget Item	Subsistence[a/]	Small Commercial	Medium Commercial	Large Commercial
Livestock Sales	$6,575	$30,300	$64,510	$187,600
Operating Costs	3,555	16,405	34,595	82,495
Net Cash Income	3,020	13,895	29,915	105,105
Ownership Costs	3,855	17,615	36,775	90,125
Net Business Income	$ (835)[b/]	$(3,720)	$(6,860)	$ 14,980

Source: Harbridge House, Inc., 1980

Notes: a/Sizes of typical ranches are as follows:

Subsistence Size, 1-74 AUs, average 24 AUs
Small Commercial Size, 75-199 AUs, average 123 AUs
Medium Commercial Size, 200-499 AUs, average 316 AUs
Large Commercial Size, 500 and more AUs, average 870 AUs

b/Parantheses indicate negative values.

As indicated, livestock sales exceed operating costs in all size categories. However, if ownership costs, including full allowance for capital depreciation and operator's labor and management, are considered, most ranches lose money. These budgets emphasize what cattlemen themselves know to be a fact: they lose money in the long-term by staying in the business, but they do so out of love for the work and desire for the lifestyle. In this sense, ranching is a form of spending as well as a means of earning, and every year ranchers consume some of their accumulated wealth. Rising land prices in recent years have added to the paper wealth of most ranch operators, permitting them to borrow the additional money they need to stay in business.

In 1980, there were 153 livestock ranches using grazing allotments in the Planning Area. Seventy-seven operations had herds which averaged less than 75 Animal Units (AUs) over a 5-year period ending in 1980. These subsistence size ranches are generally not operated as a primary source of income for the operator and his family. All operators in this size category have non-ranch jobs or income sources. There are 28 ranches with between 75 and 199 AUs. These constitute the small commercial size category, and generate enough cash income (although not business profit) to support an operator and his family. An additional 26 ranches have 200 to 499 AUs. These medium commercial size operations support an operator, a hired hand, and their families. The largest size category comprises 22 ranches with 500 or more AUs. These operations have an average of two hired hands.

In 1980, all ranch size categories in the Planning Area had total livestock sales estimated at $7.2 million as shown in Table 2-22.

TABLE 2-22

LIVESTOCK SALES AND RANCH INCOME FROM THE PLANNING AREA, 1980

Budget Item	Subsistence[a/]	Small Commercial	Medium Commercial	Large Commercial	Total
Livestock Sales	$506,160	$878,730	$1,677,215	$4,127,160	$7,189,265
Net Cash Income	232,575	402,925	777,725	2,312,305	3,725,530
Net Business Income	(64,245)[b/]	(107,975)	(178,450)	329,590	(21,080)

Source: Harbridge House, Inc., 1980.

Notes: a/Sizes of typical ranches are as follows:

Subsistence Size, 1,074 AUs, average 24 AUs
Small Commercial Size, 75-199 AUs, average 123 AUs
Medium Commercial Size, 200-499 AUs, average 316 AUs
Large Commercial Size, 500 and more AUs, average 870 AUs

b/Parentheses indicate negative values.

Total cash income generated by these sales was over $3.7 million, of which an estimated more than half or $1.9 million was treated as personal income by ranch operators. However, when depreciation and other non-cash business costs are allowed for, the combined business income of ranching operations using public land in the Planning Area was negative by $21,080. The return capital was negative on total investment of approximately $50 million. This negative return was cushioned by appreciation in the value of ranch land (although not necessarily in the value of the ranch business).

The 153 ranches utilizing public land in the Planning Area vary not only by size, but also by the extent of their dependency on grazing permits to provide forage for their herds. In general, the smaller ranches are relatively more dependent on public land. Ranches in the subsistence size category, averaging 24 AUs, relied on permits for 70.5 percent of their forage. The small commercial size operations, averaging 123 AUs, were dependent for 63.6 percent. The medium commercial size ranches, averaging 316 AUs, used public land to support 59.8 percent of their herds. Only the large commercial size operators had greater resources in their privately-owned and state-leased lands; these ranches averaged 870 AUs in size and were dependent for 40.7 percent of that total.

The significance of grazing permits is financial as well as operational. Most ranchers regularly borrow to cover their operating costs; many incur significant long-term debt in order to make improvements and purchase machinery. In 1980, financial institutions were valuing ranches on the basis of the AUMs they controlled, including AUMs dependent on public land. This loan valuation exceeded $21.9 million in 1980. The actual extent of indebtedness among ranch operators is unknown. Many ranchers inherited their operations or purchased them on favorable terms from relatives or in-laws. However, a few have entered the business without such assistance and in order to do so, borrowed heavily. These operators are usually young and expect to earn the necessary returns to repay loans with better than average livestock sales and carefully controlled costs.

In 1980, approximately 2,846 visitor days resulting from big game hunting on public land were recorded in the SRGPA. While big game hunting is not considered a major source of economic activity for the Planning Area, expenditures attributed to deer and pronghorn hunting on public land contributed an estimated $69,573 to the regional income. This amount is based only on expenditures attributed to hunting, excluding the cost-of-living.

Social Conditions

More than half of the land in the SRGPA is under BLM's jurisdiction, therefore there is a great interest among the public concerning the decisions of the agency, especially as the extent and rate of urbanization increases. In addition, public land is perceived as a basic resource upon which a range of not only economic activities, but public services, recreational activities, and community lifestyles depend. This perception appears to increasingly translate into pressure to open public land near urban areas to alternative uses.

Many of the permit holders with allotments in the Planning Area inherited their operations and thus identify ranching activities with their family history. These families, who represent some of the early pioneers of southern New Mexico, often operate their ranches in conjunction with several generations of their family and are strongly committed to passing their operations on to their children. The older families, by reason of their long residence in the county, are represented in positions of political responsibility and social prestige in greater proportion than their numbers in the population would predict. This pattern is maintained and strengthened by a complex network of intermarriage among the members of the oldest families.

The value system of the ranching population emphasizes at its core individual self-sufficiency and independence. As a part of that belief, there is a strong identification with the private enterprise system and free market economics. This value is manifested in the conduct of business, but more significantly in the perception of the land. Closely associated are a belief in the importance of self-help and hard work, and of the individual's right to control the key resources in his particular extreme. In this regard, traditionally, the leasing of land has not been attractive to ranchers in that they prefer to "own the land they use." In other words, they plan for its utility and they control access to it, etc. Ownership and control is further emphasized by ranchers and rural neighborhoods who see the importance of close ties to the land.

As described earlier, only the large commercial operations are technically profitable, all others cover expenses only with some form of supplementary income. Yet even as the rancher goes to work in city jobs, he remains separate in attitude and belief from his urban counterparts. It seems fair to assume that explaining rancher behavior in light of maximizing profits is less realistic than explaining his behavior as attempting to achieve a satisfactory return on his investment in order to survive in a rural lifestyle that he regards as important. With approximately 25 percent of the ranchers holding outside jobs, maintaining his ranch as part business, part home, and part way of life is a rancher's most important goal. Many identify themselves as ranchers on attitudinal rather than economic grounds.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter identifies and evaluates impacts to the human and natural environment which would result from implementation of the Proposed Action (PA) or the alternatives of No Action (NA), Elimination of Livestock Grazing (ELG), Maximization of Livestock Forage Production (MLFP), and the Enhancement of Other Resource Values (EORV). None of the alternatives would have significant impacts on climate, topography, geology, areas of critical environmental concern, or other land uses. For this reason they are not included in the following discussion.

The cause of an impact is tied to a component of the PA and alternatives as identified in Chapter 1. The effect of the impact is tied to a component of the environment described in Chapter 2. The impacts discussed in this chapter were assessed on the basis of the description of the PA and alternatives presented in Chapter 1. This assessment took into account the design features and federally required measures to minimize environmental impacts. The absence of discussion of impacts indicates that the analyses either determined that an impact would not occur or that it would be insignificant. Because of the design features included in Chapter 1 as standard operating procedures, and because of the BLM's commitment to implementing these design features, the impacts assessed in this chapter are considered to be unavoidable.

There was no detailed study as to which alternative would be the most efficient in conserving energy and only general observations are possible. The PA and EORV Alternative would require mechanical vegetation treatments on 600 acres, while the MLFP Alternative would require vegetation treatments on 24,683 acres. Chemical treatment would be applied to 39,477 acres under the PA and EORV Alternative and 772,421 acres under the MLFP Alternative. No vegetation treatment would be implemented under the ELG nor the NA Alternatives. Rangeland improvements would be required under all alternatives except the NA and ELG Alternatives, although rangeland improvements would continue at the present rate under the NA Alternative. Although all alternatives would require the expenditure of energy, the MLFP Alternative would require the most followed by the EORV, PA, NA, and ELG Alternatives.

Energy use for the PA and alternatives will not be evaluated further because of the lack of reliable information. The cost effectiveness (including energy use) of discrete action would be analyzed in environmental assessments prepared before such actions are implemented.

There would be optimum achievement of resource potentials in the long-term with the PA. In addition, the PA would be more balanced in achieving the objectives of a grazing management system that would in the long-term meet the demand for livestock forage production, wildlife, and other resource values, both renewable and depletable.

The description of the analysis of impacts follows in order of diminishing consequence except for Social and Economic Conditions. These impacts are discussed last, enabling a summation of the impacts of all the natural resources on the human resource. The analysis of impacts is presented by resource and by alternative. A brief summary is provided only at the end of sections containing complex or lengthy discussions of impacts.

Several basic assumptions have been made by BLM specialists in assessing the impacts on various environmental elements.

1. The BLM would have the funds and manpower to implement the proposal or any alternative selected.

2. Short-term impacts are those which would occur within 9 years after implementation. Long-term impacts are those that would still exist by the year 2010.

3. Grazing impacts are described according to their effect on the different range sites. Environmental impacts from new rangeland improvements and the continued use of existing ones are described in terms that apply for the entire Southern Rio Grande Planning Area.

4. The BLM would verify the level of impacts and monitor and evaluate grazing management treatments prior to and after they are implemented so the necessary adjustments in those treatments not meeting multiple use objectives can be made. Monitoring of key forage species and wildlife population trends would be done annually.

5. Site-specific Environmental Assessments (EAs) would be written to assess site-specific impacts of each grazing management system. Onsite analysis of areas proposed for inclusion in proposed vegetation treatments would be made to avoid highly desirable resource values that could be affected by the treatments being considered.

6. The quantity of forage allocated to big game would be sufficient. It is assumed that forage quality would be satisfactory for big game maintenance and reproduction.

7. Because information concerning actual livestock use has not been collected, an exact amount is not known. Estimates by BLM specialists are that actual use is approximately equal to average licensed use although a few operations probably vary from this amount each year.

8. Technical references demonstrate that there is considerable variation in the response of vegetation and other resources to grazing and wildlife management programs. Scientific knowledge is not presently available to assess long-term impacts to the fullest extent. The techniques available for predicting impacts are not precise, but rather provide an indication of the type and general magnitude of expected changes. Although impacts are stated in quantitative terms where possible, the numbers given should be taken as an indication of approximate, not absolute, amounts of change.

9. Existing rangeland improvements will be maintained in a serviceable condition except as described in the ELG Alternative.

10. Based on historical records, BLM vegetation specialists assume that most of the Planning Area's existing brush is a result of its invasion onto rangeland which had previously been dominated by grass.

11. Herbicides for brush control would be those which have been approved for use by the appropriate federal and state agencies so that no program delay would occur.

12. The economic assessment was based on the assumption that livestock market conditions would remain constant.

13. The economic assessment assumes that capital values of grazing permits (per animal unit) would not change.

14. The ranch budgets constructed for this assessment constitute a composite economic model which describes "typical ranches" in the Planning Area and are not the budgets of any particular ranches.

15. The ranch budgets used for this assessment constitute an economic model of ranches as profit maximizing enterprises, and cannot completely describe any behavior that is influenced by noneconomic factors. In this regard a standard allowance was made for depreciation of ranch equipment and improvement, although many ranch operators do not make full provision for such costs. To the extent that ranchers operating within the Planning Area have fully depreciated their capital investment, the allowance for capital depreciation might tend to overstate costs and underestimate profits. However, to be consistent with the practices of the economic statistics and cooperative service of the U.S. Department of Agriculture, fixed costs were included as a necessary component of the ranch budgets.

16. The ranch budgets used for this assessment are based on the total herd sizes of affected ranch operators, rather than simply on the number of animal units directly dependent on public land. In order to describe accurately the full impacts of the PA and its alternatives on ranches in the Planning Area, the analysis was based on total combined

adjustments in levels of grazing (those required by BLM and those indirectly resulting from federal requirements) on federal, state, and private lands. Therefore, projected impacts on ranch sales and net income are likely to be larger than if they were simply based on changes in federal AUs, and differ in this way from all other impacts described in the EIS.

17. The assessment of economic impacts are based on the assumption that neither the PA nor any of the alternatives would result in any change in the calf crop percentage (number of calves weaned per hundred cows) or in the average weights of animals marketed.

ASSESSMENT OF IMPACTS

Vegetation

Impacts on the vegetative resource that would result from the Proposed Action (PA) or alternatives can be divided into two separate categories. The impacts resulting from construction activities required to complete the proposed rangeland improvements would occur immediately and be definitely defined. Short-term impacts would occur where vegetation was disturbed during the construction activities. Long-term impacts would occur where the vegetative resource is replaced by the improvement and by the increased concentration of grazing animals in the vicinity of the completed improvement.

The impacts resulting from the different intensities of grazing use outlined in the PA or alternatives would not be readily noticeable on all sites. Any changes resulting from these actions may be gradual and on sites dominated by brush species would not be noticeable for years. Influence from other factors such as variations in climatic conditions would affect the rate or degree of change. Campbell (1931) indicates seriously depleted rangelands on clay soils in New Mexico may be restored by natural succession, but improvement does not occur immediately and may require years or even decades.

Methodologies used for assessing the projected changes under the various alternatives are in Appendix B-2.

Proposed Action (PA)

Under the PA, vegetation would be disturbed or destroyed at the location of the proposed rangeland improvements. These areas would amount to 734 acres in the short-term and 114 acres in the long-term that would be occupied by the rangeland improvements.

The amount of vegetative disturbance occurring during construction would vary with the methods used. Pipelines which could be ripped in using flexible pipe would cause less disturbance than those which require rigid pipe and trenching for placement.

Additional grazing pressure would occur around the proposed new waters and in some locations as a result of new fences. The impacts resulting from this additional grazing use would be partially offset by the reduction in use around existing waters and improved distribution of livestock which the new waters and fences would provide.

Under the PA, the short-term consumption of forage would not change until monitoring studies determine a balance between forage produced and forage utilized based on the proper use of each species and the relative abundance of the species being utilized on each allotment. Based on available data, monitoring studies may indicate reductions are needed on many of the allotments to arrive at a stocking rate consistent with the management objective of improving the vegetative resource. Most grazing studies in the southwest show a need for a change in management along with proper stocking rates in order to obtain effective results in rangeland improvement (Cable and Martin 1964; Paulsen and Ares 1962; Canfield 1939).

The long-term impact of the PA would be an increase in production and cover of the desirable and intermediate forage species which are preferred by grazing animals. With proper management which allows for rest during certain critical stages of plant growth, these species could increase in numbers. Reduced grazing use increases plant vigor thereby increasing seed production and revegetation from seedlings, rhizome, and stolons.

The analysis of data from the vegetative inventory indicates that the ecological condition class (e.g., poor or fair) is not relative to total production from all species, percent vegetative ground cover, or litter. However, this data does indicate in most cases the desirable and intermediate species make up an increasingly larger percentage of the total production and ground cover when comparing the poor to fair and fair to good, respectively. Based upon this data, it would be possible to increase the more desirable forage species to varying degrees depending upon each particular range site.

The grazing management under the PA would be based on the utilization studies conducted as part of the monitoring of grazing allotments. The adjustments needed to bring stocking rates in line with grazing capacities would reduce grazing pressure on the desirable and intermediate forage species on the allotments which are now overstocked. These adjustments in conjunction with changes in management which provides for rest from grazing of the forage producing species during certain critical periods would increase the vigor of plants thereby increasing the reproduction capabilities of the plants. These changes in plant reproduction capabilities would increase both production and ground cover of the desirable and intermediate forage species.

Using the relationship of production and percent ground cover of the desirable and intermediate forage species and total vegetative ground cover which exists between the different ecological condition classes projections can be made on the expected changes which would occur as a result of changes in management.

The projected changes in production and percent ground cover of the desirable and intermediate species and the percent of the ground covered by live vegetation are shown in Table 3-1. The projected changes in the acres in each ecological condition class and forage value class which would occur as a result of the projected changes in species composition are shown in Table 3-2.

These projections are based on the existing production and ground cover of a particular vegetative subtype on a particular range site in one ecological condition class compared to the existing production and ground cover of the same vegetative subtype and range site in another ecological condition class.

Projections for changes in the acres in ecological condition or forage value class were based on the amount of potential for improvement that each individual site write-up area (SWAs) possesses.

Under the PA, 29,772 acres of mesquite vegetation and 9,705 acres of creosote would be treated with chemicals to reduce the composition for available moisture. Cholla would be mechanically removed from 600 acres.

Two herbicides are proposed for use in controlling mesquite and creosote. They are Dowco 290 (3, 6-dichloropicolinic acid) and Graslan (tebuthiuron). Dowco 290 is a liquid herbicide and would be mixed with water, while Graslan is a pelletized herbicide. Dowco 290 would be used primarily to treat mesquite as it has proved to be effective on mesquite without damaging more palatable vegetation. Graslan would be used primarily on creosote as it has proved to be effective on creosote at low rates of application.

Short-term impacts would occur within 1 to 3 years following application of chemicals. If chemical treatments were successful, 40 to 50 percent kills would be expected on brush species. Forb growth would be reduced, especially where Graslan was used, during the first 2 to 3 years following the application of chemicals. Forb growth would begin increasing during the third growing season. The reduction of forbs as part of available forage for grazing would have only a minor effect on livestock use because of the requirement of 16 months deferment after treatment.

As the competition for available moisture was reduced the desirable forage species would increase in abundance. This increase would provide additional forage which would be two to three times what was previously available.

TABLE 3-1

AVERAGE PRODUCTION AND PERCENT TOTAL VEGETATIVE GROUND COVER[a/]

PROPOSED ACTION

Dominant Vegetation	Grass			Brush			Pinyon-Juniper		
Present Ecological Condition	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
Production in pounds per acre of desirable and intermediate forage species									
Existing	270	375	483	129	258	300	337	372	742
Projected	462	495	582	295	351	357	471	518	764
Percent of total vegetative ground cover comprised of desirable and intermediate forage species									
Existing	41	56	68	28	35	36	46	58	62
Projected	68	74	75	46	51	47	59	72	75
Percent total vegetative ground cover									
Existing	19	19	20	17	18	18	23	24	17
Projected	25	23	21	21	21	19	26	28	19

Source: Las Cruces District BLM Inventory Data, 1980.

Notes: a/From Data in Appendix B-6.

TABLE 3-2

PROJECTED ACRES FOR EACH ECOLOGICAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

PROPOSED ACTION

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	87,246	398,785	87,575	83,966	350,739	138,901
Deep sand	2,333	10,798	33,854	3,848	14,945	28,192
Sandy	9,266	146,549	398,870	17,035	131,907	405,743
Loamy	302	24,546	38,191	6,091	34,310	22,638
Shallow sand		49,709	125,957	8,814	62,989	103,863
Draw	21,294	11,081	10,063	21,444	11,272	9,722
Bottomland	1,048	10,166	23,166	3,303	14,356	16,721
Limestone hills	6,362	43,092	26,464	30,516	30,533	14,869
Clayey	11,715	12,174	2,025	7,173	15,028	3,713
Gravelly sand	1,990	67,263	26,858	2,976	42,912	50,223
Igneous hills	24,173	117,450	28,345	97,168	51,448	21,352
Gravelly loam	4,136	27,842	32,819	5,708	19,175	39,914
Salt flats	15,257	3,804	7,497		18,094	8,464
Malpais		48,113	73,318	16,033	33,818	71,580
Subtotal	185,122	971,372	915,002	304,075	831,526	935,895
Western Plateau MLRA 36						
Gravelly	1,937	8,757	3,145	5,567	7,506	766
Hills	6,788	16,808	9,939	22,953	8,096	2,486
Loamy	1,273	1,988	89	3,203	70	77
Breaks	3,501	8,268	894	11,709	953	1
Bottomland		37				37
Clayey		23	99	23	99	
Basalt hills	3,160	6,994	751	9,895	1,010	
		87		87		
Subtotal	16,659	42,962	14,917	53,437	17,734	3,367
TOTAL	201,781	1,014,334	929,919	357,512	849,260	939,262

Source: BLM Las Cruces District Inventory Data, 1980.

Martin (1966) reports the estimated number of animal units to graze 40 percent of the perennial grass crop increased by 169 percent between 1954 and 1961 on pastures where mesquite had been controlled. Cable and Martin (1964) stated "perennial grass production on mesquite killed range increased from 220 pounds to 443 pounds per acre." The Annual Research Progress Report (CY 1979) for the Jornada Experimental Range (USDA 1980) indicates a creosote area rootplowed and seeded in 1972 produced 1,327 pounds of grasses and forbs per acre, while on adjoining untreated areas, grass and forb production was only 176 pounds per acre. This report also indicates 3 to 8 times as much production of perennial grasses on sprayed areas than on the control over a three-year period and has allowed stocking rates to be raised 3 to 4 times above that on non-treated areas.

Removal of cholla would not increase production of grass species. Its removal would make the forage more accessible by removing obstructions to grazing animals. Martin (1975) reports cholla is a problem primarily because it occupies space and interferes with handling cattle. It does not appear to compete seriously with perennial grasses.

Threatened or Endangered Plant Species. Many of the threatened or endangered plant species are either unpalatable and would seldom be grazed or are located on sites where little grazing occurs. Spellenberg (1976) indicates that even though livestock do not graze most of these species, the presence of livestock grazing other species or breaking of the soil by trampling is the major habitat disturbing factor. The reduction of livestock numbers under the PA would cause less disturbance of the habitat of the threatened or endangered plants by reducing grazing on the associated plant species.

Areas where threatened or endangered plants occur would be identified and avoided where adverse impacts would occur from rangeland improvements and vegetation treatments.

Summary. Under the PA, vegetation would be disturbed or destroyed on 734 acres in the short-term and 114 acres in the long-term as a result of the proposed rangeland improvements and the associated construction activities.

The acres in each ecological condition class would change from 1,453,369; 660,347; and 32,318 for poor, fair, and good respectively to 929,919; 1,014,334; and 201,781. The acres in each forage value class would change from 1,196,844; 668,885; and 280,305 for poor, fair, and good respectively to 939,262; 849,260; and 357,512. Average production of the desirable and intermediate forage species would increase on the grass type vegetation from 270; 375; and 483 pounds per acre on poor, fair, and good condition rangeland respectively to 462; 495; and 582 pounds per acre. Increased average production of the desirable and intermediate forage species on brush type vegetation for the three condition classes would be from 129; 258; and 300 to 295; 351; and 357 pounds per acre and on the pinyon-juniper type from 337; 372; and 742 to 471; 518; and 764 pounds per acre. The percent of the total vegetative ground cover comprised of desirable and intermediate forage species would increase on grass type vegetation from an average of 41; 56; and 68 for poor, fair, and good condition to 68; 74; and 75 percent respectively. The increases on brush type vegetation would be from 28; 35; and 36 to 46; 51; and 47 and on the pinyon-juniper type from 46; 58; and 62 to 59; 72; and 75 percent respectively for poor, fair, and good condition.

No Action (NA) Alternative

Under the NA Alternative, the intensity of grazing use would not be changed but could increase or decrease from year-to-year depending upon each grazing permittee's situation. Increases in AUMs of use up to the preference could occur on some of the allotments during some years. No changes in management would occur.

Livestock distribution and grazing patterns on most allotments would remain the same. Allotments continually grazed yearlong would continue to have preferred forage species utilized heavily each year. Unless adequate watering facilities were available to provide even distribution of livestock over the entire allotment, areas closest to waters would continually be utilized heavier than the areas long distances from waters. Improvement in vegetative conditions would occur only where intensity of grazing is light.

Cattle graze from the best forage plants on the most accessible parts of the range 365 days per year (Martin 1966). The natural end result of this process is that the most productive parts of the rangeland eventually become the least productive.

Continuing stocking rates at the current level would mean that much of the forage consumed would have to be supplied by annuals. Annual growth in the southwest is extremely variable. During certain years, annual growth is sparse creating additional grazing use on perennial plants. Martin (1972) indicates heavy grazing benefits annuals indirectly by reducing the density and vigor of competing perennials. He also indicates perennial grasses outperform annuals in dry summers because they begin to produce forage at once if the soil is wet. A single rain that merely germinates the seed of annual grasses may grow several inches of forage on perennials. Perennial grass provides a more reliable forage supply year in and year out than does rangeland dominated by annuals.

The projected changes in production and percent of the total ground cover comprised of desirable and intermediate forage species and percent total vegetative ground cover are shown in Table 3-3. The

TABLE 3-3

AVERAGE PRODUCTION AND PERCENT TOTAL VEGETATIVE GROUND COVER[a/]

NO ACTION ALTERNATIVE

Dominant Vegetation	Grass			Brush			Pinyon-Juniper		
Present Ecological Condition	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
Production in pounds per acre of desirable and intermediate forage species									
Existing	270	375	483	129	258	300	337	372	742
Projected	256	356	459	123	245	285	320	353	705
Percent of total vegetative ground cover comprised of desirable and intermediate forage species									
Existing	41	56	68	28	35	36	46	58	62
Projected	39	53	65	27	33	34	44	55	59
Percent total vegetative ground cover									
Existing	19	19	20	17	18	18	23	24	17
Projected	18	18	19	16	17	17	22	23	17

Source: Las Cruces District BLM Inventory Data, 1980.

Notes: a/From Data in Appendix B-6.

projected changes in acres in each ecological condition class and forage value class which would occur as a result of the projected changes in species composition are shown in Table 3-4.

The projected changes are based on continuing or even greater intensity of grazing use should additional numbers of livestock graze the allotments. This intensity of use along with no apparent change in management would continue to cause heavy grazing use on the desirable forage species resulting in reduced vigor and reproduction.

Overall, any improvement in rangeland conditions occurring under the NA Alternative would be the result of climatic conditions. During extended periods of above normal precipitation rangeland conditions would temporarily improve. During extended periods of below normal precipitation, rangeland conditions would again deteriorate. The result would be a fluctuating trend depending upon weather condition with no permanent improvement occurring.

Threatened or Endangered Plants. The impacts on threatened or endangered plant species under the NA Alternative would be the same as the existing situation. Disturbances of the habitat where these species are found and affected by grazing activities would increase or decrease in relation to the increase or decrease in grazing intensity.

Summary. Under the NA Alternative, the acres in each ecological condition class would change from 1,453,369; 660,347; and 32,318 for poor, fair, and good respectively to 1,687,059; 441,794; and 17,181. The acres in each forage value class would change from 1,196,844; 668,885; and 280,305 for poor, fair, and good respectively to 1,261,035; 621,522; and 263,477. Average production of the desirable and intermediate forage species would decrease on the grass type vegetation from 270; 375; and 483 pounds per acre on poor, fair, and good condition rangeland respectively to 256; 356; and 459 pounds per acre. Average production of the desirable and intermediate forage species on brush type vegetation would decrease for the three condition classes from 129; 258; and 300 to 123; 245; and 285 and on the pinyon-juniper type from 337; 372; and 742 to 320; 353; and 705 pounds per acre. The percent of the total vegetative ground cover comprised of desirable and intermediate forage species would decrease on grass type vegetation from an average of 41; 56; and 68 for poor, fair, and good condition to 39; 53; and 65 percent respectively. The decreases on brush type vegetation would be from 28; 35; and 36 to 27; 33; and 34 and on the pinyon-juniper type from 46; 58; and 62 to 44; 55; and 59 percent respectively for poor, fair, and good condition.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, no forage on public land would be utilized by livestock grazing. Under this alternative, no new rangeland improvements would be initiated eliminating the impacts on the vegetative

TABLE 3-4

PROJECTED ACRES FOR EACH ECOLOGICAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

NO ACTION

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	2,133	192,165	379,308	42,330	187,850	343,426
Deep sand		3,500	43,485	2,659	14,729	29,597
Sandy	204	18,123	536,358	8,345	129,139	417,201
Loamy		3,019	60,020	5,289	25,641	32,109
Shallow sand		4,828	170,838	7,933	48,751	118,982
Draw	422	24,554	17,462	5,062	24,316	13,060
Bottomland		1,589	32,791	2,687	12,566	19,127
Limestone hills		21,218	54,700	27,464	30,196	18,258
Clayey		22,753	3,161	129	17,153	8,632
Gravelly sand		17,834	78,277	1,135	9,399	85,577
Igneous hills	948	75,575	93,445	94,642	38,588	36,738
Gravelly loam		5,686	59,111	5,423	14,792	44,582
Salt flats	10,045	5,803	10,710		18,094	8,464
Malpais		14,892	106,539	14,029	28,375	79,027
Subtotal	13,752	411,539	1,646,205	217,127	599,589	1,254,780
Western Plateau MLRA 36						
Gravelly	196	4,165	9,478	5,010	7,312	1,517
Hills	2,921	10,612	20,002	22,035	6,877	4,623
Loamy	164	2,552	634	2,847	426	77
Breaks	148	5,705	6,810	6,958	5,704	1
Bottomland			37			37
Clayey		23	99	23	99	
Basalt hills		7,111	3,794	9,390	1,515	
Sandy		87		87		
Subtotal	3,429	30,255	40,854	46,350	21,933	6,255
TOTAL	17,181	441,794	1,687,059	263,477	621,522	1,261,035

Source: BLM Las Cruces District Inventory Data, 1980.

resource resulting from construction activities. The impacts resulting from utilization of forage by livestock would be eliminated.

Under the ELG Alternative, the response of the vegetative resource resulting from the elimination of grazing by livestock would vary from range site to range site. In theory it would appear that by eliminating grazing all impacts on the vegetative resource would be removed; this is not necessarily true. During lengthy drought periods, stands of perennial grass species are often reduced. On the Jornada Experimental Range (near Las Cruces), the basal cover of black grama was reduced to 42 percent of its predrought cover during the 1916-18 drought; 11 percent during the 1921-26 drought; and 23 percent in 1934. From 1951-56 black grama was reduced 1 to 50 percent of its predrought average, depending on soil type, during one of the more severe droughts in recent years (Herbel et al. 1974).

Comparison area data studies (in the Las Cruces District) comparing exclosures which had excluded livestock grazing from 10 to 15 years with adjacent areas outside the exclosures indicate vegetative ground cover and litter accumulation on comparable sites vary at different locations and with vegetative types (BLM 1973).

On a desert shrub vegetation type, the vegetative ground cover was 12 percent greater and litter accumulation 14 percent greater on the exclosed areas. On grass type vegetation, the vegetative ground cover of the exclosed areas ranged from no difference to 75 percent more than the grazed area. Litter accumulations were 12 to 350 percent more on the exclosed areas.

Blydenstein, et al. (1957) indicates the most notable change under protection was an overall increase in density of the vegetation although most of the same species occurred on both the protected and unprotected areas.

Potter and Krenetsky (1967) found on a desert grassland type cover increased under protection about 60 percent from 10.60 to 16.38 with the relative cover of grasses increasing from 23 to 70 percent of the vegetation. On a pinyon-juniper type, the forage production averaged twice as much under protection as under grazing in the open woodlands, but very little change in dense woodland.

The increase in litter accumulation resulting from the elimination of grazing would increase the occurrence of both lightning and man-caused wild fires. An increased number of fires would occur on an estimated 300,000 acres of public land requiring additional effort in detection and suppression. The amount of this increase cannot be predicted since most rangeland fires are caused by dry lightning storms. This type of storm is so variable in occurrence and intensity from year-to-year that predicting the number would be impossible. The short-term impact would be minor since in the desert southwest 10 to 15 years of occurrence would vary depending upon plant species. Populations of plants which are susceptible to damage from fire would be reduced or eliminated. Growth of plant species which are benefited by fire would increase. All surface protecting litter would be destroyed and lost until future accumulations occurred.

The projected changes in production and percent of the total ground cover comprised of desirable and intermediate forage species and percent vegetative ground cover are shown in Table 3-5. The projected changes in acres in each ecological condition class and forage value class which would occur as a result of the projected changes in species composition are shown in Table 3-6.

The projected changes are based on the potential for improvement of each SWA based on the existing species composition and the effect of eliminating grazing use.

Threatened or Endangered Plant Species. All adverse impacts to threatened or endangered plant species from livestock grazing would be removed under this alternative. Any beneficial impacts favoring the growth and reproduction of threatened or endangered would also be removed.

Summary. Under the ELG Alternative, the acres in each ecological condition class would change from 1,453,369; 660,347; and 32,318 for poor, fair, and good respectively to 639,198; 1,193,949; and 312,887. The acres in each forage value class would change from 1,196,844; 668,885; and 280,305 for poor, fair, and good respectively to 696,501; 1,038,047; and 411,486. Average production of the desirable and intermediate forage species would increase on the grass type vegetation from 270; 375; and 483 pounds per acre on poor, fair, and good condition rangeland respectively to 531; 569; and 669 pounds per acre. Average production of the desirable and intermediate forage species on brush type vegetation would increase for the three condition classes from 129; 258; and 300 to 340, 404; and 410 and on the pinyon-juniper type from 337; 372; and 742 to 542; 596; and 879 pounds per acre. The percent of the total vegetative ground cover comprised of desirable and intermediate forage species would increase on grass type vegetation from an average of 41; 56; and 68 for poor, fair, and good condition to 78; 82; and 83 percent respectively. The increase on brush type vegetation would be from 28; 35; and 36 to 53; 59; and 54, and on the pinyon-juniper type from 46; 58; and 62 to 68; 81; and 85 percent respectively for poor, fair, and good condition.

Maximization of Livestock Forage Production (MLFP) Alternative

Under the MLFP Alternative, vegetation would be disturbed or destroyed at the location of rangeland improvements. This would amount to 1,067 acres in the short-term and 162 acres occupied by the improvements in the long-term.

TABLE 3-5

AVERAGE PRODUCTION AND PERCENT TOTAL VEGETATIVE GROUND COVER[a/]

ELIMINATION OF LIVESTOCK GRAZING ALTERNATIVE

Dominant Vegetation	Grass			Brush			Pinyon-Juniper		
Present Ecological Condition	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
Production in pounds per acre of desirable and intermediate forage species									
Existing	270	375	483	129	258	300	337	372	742
Projected	531	569	669	340	404	410	542	596	879
Percent of total vegetative ground cover comprised of desirable and intermediate forage species									
Existing	41	56	68	28	35	36	46	58	62
Projected	78	82	83	53	59	54	68	81	85
Percent total vegetative ground cover									
Existing	19	19	20	17	18	18	23	24	17
Projected	29	26	24	24	24	22	30	31	22

Source: Las Cruces District BLM Inventory Data, 1980.

Notes: a/From Data in Appendix B-6.

TABLE 3-6

PROJECTED ACRES FOR EACH ECOLOGICAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

ELIMINATION OF LIVESTOCK GRAZING

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	131,326	377,224	65,056	106,604	395,787	71,215
Deep sand	3,500	20,803	22,682	6,571	20,192	20,222
Sandy	12,664	244,198	297,823	30,418	187,737	336,530
Loamy	1,642	41,446	19,951	7,223	42,813	13,003
Shallow sand	2,896	93,837	78,933	15,317	89,666	70,683
Draw	24,056	12,085	6,297	23,479	11,021	7,938
Bottomland	1,362	11,613	21,405	3,600	14,481	16,299
Limestone hills	15,619	43,186	17,113	31,645	31,337	12,936
Clayey	21,166	3,284	1,464	1,825	20,853	3,236
Gravelly sand	9,657	77,054	9,400	4,612	56,107	35,392
Igneous hills	38,653	115,555	15,760	99,935	55,475	14,558
Gravelly loam	6,342	44,233	14,222	6,018	32,983	25,796
Salt flats	15,783	7,101	3,674		21,856	4,702
Malpais	4,974	60,460	55,997	16,033	44,774	60,624
Subtotal	289,640	1,152,079	629,777	353,280	1,025,082	693,134
Western Plateau MLRA 36						
Gravelly	3,014	8,922	1,903	6,318	6,755	766
Hills	8,529	18,432	6,574	24,909	6,140	2,486
Loamy	1,752	1,548	50	3,203	70	77
Breaks	5,212	6,557	894	12,662		1
Bottomland		37				37
Clayey		122		122		
Basalt hills	4,740	6,165		10,905		
Sandy		87		87		
Subtotal	23,247	41,870	9,421	58,206	12,965	3,367
TOTAL	312,887	1,193,949	639,198	411,486	1,038,047	696,501

Source: BLM Las Cruces District Inventory Data, 1980.

The grazing management under the MLFP Alternative would be the same as the PA. The short-term consumption of forage would not change until monitoring studies determine a proper stocking rate based on the proper use of each forage species in relation to the relative abundance of the species resulting from utilization and actual use studies on each allotment.

The major component of this alternative would be the impacts resulting from the proposed chemical and mechanical treatments on 797,104 public land acres.

Under this alternative, 391,218 public land acres of creosote and 381,203 acres of mesquite would be treated with chemicals. Mechanical treatment plus seeding would be completed on 11,765 acres of tarbush and 12,318 acres of creosote.

Short-term impacts resulting from the chemical treatment would be a reduction in vegetative ground cover as a result of the projected 40 to 50 percent kill of the brush species and loss of most of the forb growth during the first to third years after treatment.

Short-term impacts resulting from the mechanical treatment would be almost complete elimination of vegetative growth on the soil surface until regrowth from the seeding treatment became established. Most of the vegetative growth removed by the mechnical treatment would remain on the soil surface as litter.

Two herbicides are proposed for use in controlling mesquite and creosote. They are Dowco 290 (3,6 dichloropicolinic acid) and Graslan (tebuthiuron). Dowco 290 is a liquid herbicide and would be mixed with water, while Graslan is a pelletized herbicide. Dowco 290 would be used primarily to treat mesquite as it has proved to be effective on mesquite without damaging more palatable vegetation. Graslan would be used on creosote as it has proved to be effective on creosotebush at low rates of application.

Chemical treatment may kill at least 40 percent of all mesquite and creosote within an infestation. Killing 30 percent of treated plants would be adequate to boost forage plant production and remove the dominance of invading brush (East Roswell Grazing EIS 1979).

Foliar sprays of herbicides are absorbed through small holes in the leaf surface called stomata or directly through the leaf cuticle. At proper application rates, the chemicals are readily transported by the plants vascular system to points of active growth, such as root tips and new foilage. Herbicide movement within the plant is favored by good soil and growing conditions. Susceptible plants are killed as the herbicide is transported within the plant causing damage to the parenchyma, phloem, and cambium structures. Granular herbicides applied on the soil surface are leached into a plant's rooting zone following rain. Killing of plants occurs when the chemicals, together with nutrients and water assimilated through the soil, are drawn into the plant by the root system (East Roswell Grazing EIS 1979).

Long-term impacts under the MLFP Alternative resulting from the chemical treatment would vary depending on the range site. Chemical brush control is proposed for a wide range of range sites varying from sandy to gravelly to malpais to igneous hills. On more sandy areas, chemicals would rapidly leach into the soil following a rain. Areas with more compact soils would not permit rapid percolation into the subsurface.

Martin (1966) comparing a pasture where mesquite had been killed to one where mesquite was still alive indicates the number of animal units to graze 40 percent of the perennial grasses increased on the mesquite controlled pasture 169 percent and on the pasture where mesquite was alive 62 percent between 1954 and 1961. Cable and Martin (1964) report perennial grass production on mesquite killed range increased from 220 to 443 pounds per acre.

The Annual Research Progress Report (CY 1979) (USDA 1980) indicates that total production on sprayed areas was 878, 593, and 513 pounds per acre in 1976, 1977 and 1978 respectively while the non-sprayed area production was 306, 139, and 231 pounds per acre respectively. Perennial grass production was seven-, eight-, and three-fold greater on the sprayed area than the controlled area for the same three years. An evaluation of mesquite kill on a dune basis revealed that 18 percent of the dunes had complete stem kill, 35 percent of the dunes had 51 to 99 percent stem kill, 44 percent of the dunes had 1 to 50 percent stem kill, and 3 percent of the dunes were essentially unaffected except for temporary die-back.

During the mid-1960's the Roswell BLM District used herbicides to kill invading mesquite. These treatments resulted in significant increases of desirable grasses and forbs the first year after treatment which killed 30 to 50 percent of mesquite. Palatable forbs (e.g. spectacle-pod and bladderpod) began emerging in the open spaces between dead mesquite plants soon after arrival of the midsummer rains. First year grass recovery was primarily from sand dropseed which emerged in the mesquite canopy zones. Percentage composition of dropseed continued to increase during the second and following years. Highly desirable, perennial forage species such as black grama and plains bristlegrass made threefold increases 3 to 5 years after the dominating brush was controlled (East Roswell Grazing EIS 1979).

Under the MLFP Alternative, long-term impacts resulting from mechanical treatment and seeding on specific areas of creosote and tarbush would be the total change in the plant species composition. Total vegetative ground cover would increase 2 to 3 percent. Long-term production from seeded forage species would be an average of four times the amount available prior to treatment.

The Annual Research Progress Report (CY 1979) (USDA 1980) indicates a creosote area rootplowed and seeded in 1972 produced 1,327 pounds per acre of grasses and forbs while on an adjoining untreated area grass and forb production was only 159 pounds per acre during the 1979 growing year.

The projected changes which would occur after chemical and mechanical treatments were based on an increase from the existing ground cover and production from the projected increase from the PA depending upon the various range sites. Chemical treatments would increase ground cover and production of the desirable and intermediate forage species threefold on the deep sand, sandy, shallow sandy, draw and gravelly sand range sites. Twofold increases would occur on gravelly, loamy, bottomland, igneous hills, gravelly loam and malpais range sites. A fourfold increase was projected for production of forage species as a result of mechanical treatment and seeding.

The projected changes in average production and percent ground cover comprised of the desirable and intermediate forage species and the percent of the ground covered by live vegetation are shown in Table 3-7. Changes are shown for brush type vegetation which would receive either mechanical or chemical treatment. All other changes would be the same as the PA.

Projections for changes in the acres in each ecological condition class or forage value class are shown in Table 3-8. These acreage figures are the same as the PA except where either chemical or mechanical treatment would result in different plant species composition which changes the acres in the three condition categories.

Threatened or Endangered Plant Species. The impacts on threatened or endangered plant species would be the same as for the PA on that part of the Planning Area where no chemical or mechanical treatments are proposed. Most of these plant species are growing in areas which are not being proposed as sites for chemical or mechanical treatments. The two notable exceptions are *Cereus greggii*, desert night-blooming cereus, and *Opuntia arenaria*, club cholla.

Night-blooming cereus is found growing in association with creosote on flats and gentle slopes. It is commonly found growing within the creosote. The plants themselves are not utilized by cattle, but are dependent upon the surrounding woody vegetation for protection since the plant is brittle and readily broken by cattle nosing into bushes for grass (Spellenberg 1978). Treating these areas with chemicals would reduce the protection provided by creosote making the plant more vulnerable to damage from grazing.

TABLE 3-7

AVERAGE PRODUCTION AND PERCENT TOTAL VEGETATIVE GROUND COVER[a/]

MAXIMIZATION OF LIVESTOCK FORAGE PRODUCTION ALTERNATIVE

Dominant Vegetation	Grass			Brush			Pinyon-Juniper		
Present Ecological Condition	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
Production in pounds per acre of desirable and intermediate forage species									
Existing	270	375	483	129	258	300	337	372	742
Projected	462	495	582	687b/ 1,109c/	797b/	357	471	518	764
Percent of total vegetative ground cover comprised of desirable and intermediate forage species									
Existing	41	56	68	28	35	36	46	58	62
Projected	68	74	75	52b/ 84c/	78b/	47	59	72	75
Percent total vegetative ground cover									
Existing	19	19	20	17	18	18	23	24	17
Projected	25	23	21	21b/ 24c/	27b/	19	26	28	19

Source: Las Cruces District BLM Inventory Data, 1980.

Notes: a/From Data in Appendix B-6.
b/Chemical Treatment.
c/Mechanical Treatment.

TABLE 3-8

PROJECTED ACRES FOR EACH ECOLOGICAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

MAXIMIZATION OF LIVESTOCK FORAGE PRODUCTION

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	164,098	381,260	28,248	160,818	333,214	79,574
Deep sand	2,333	18,444	26,208	3,848	22,591	20,546
Sandy	15,032	317,983	221,670	22,821	30,332	228,543
Loamy	422	35,284	27,333	6,211	45,048	11,780
Shallow sand	1,128	72,077	102,461	9,942	85,357	80,367
Draw	21,294	13,279	7,865	21,444	13,470	7,524
Bottomland	1,048	11,665	21,667	3,303	15,855	15,222
Limestone hills	6,362	43,092	26,464	30,533	14,869	30,516
Clayey	11,715	12,174	2,025	7,173	15,028	3,713
Gravelly sand	3,398	67,928	24,785	4,384	43,577	48,150
Igneous hills	24,331	118,516	27,121	97,326	52,514	20,128
Gravelly loam	6,149	34,121	24,527	6,171	25,454	33,172
Salt flats	15,257	3,804	7,497		18,094	8,464
Malpais		58,181	63,250	17,494	32,357	71,580
Subtotal	272,567	1,187,808	611,121	391,468	1,020,749	659,279
Western Plateau MLRA 36						
Gravelly	2,512	8,182	3,145	6,142	6,931	766
Hills	6,788	16,808	9,939	22,953	8,096	2,486
Loamy	1,273	1,988	89	3,203	70	77
Breaks	3,501	8,268	894	11,709	953	1
Bottomland		37				37
Clayey		23	99	23	99	
Basalt hills	3,160	6,994	751	9,390	1,515	
Sandy		87		87		
Subtotal	17,234	42,387	14,917	53,507	17,664	3,367
TOTAL	289,801	1,230,195	626,038	444,975	1,038,413	662,646

Source: BLM Las Cruces District Inventory Data, 1980.

Club cholla is found growing in sandy areas among creosote or mesquite. Grazing does not adversely affect this species and it could be expected to increase as grazing opens the ground cover. Movement of livestock through an area may help to spread it (Spellenberg 1978).

Areas where threatened or endangered plants occur would be identified and avoided where adverse impacts would occur from rangeland improvements and vegetation treatments.

Summary. Under the MLFP Alternative, vegetation would be disturbed or destroyed on 1,067 acres in the short-term and 162 acres in the long-term as a result of the proposed rangeland improvements and the associated construction activities.

Impacts resulting from grazing under this alternative would be the same as the PA on all areas where no chemical or mechanical treatments are proposed.

The acres in each ecological condition class would change from 1,453,369; 660,347; and 32,318 for poor, fair, and good respectively to 626,038; 1,230,195; and 289,801. The acres in each forage value class would change from 1,196,844; 668,885; and 280,305 for poor, fair, and good respectively to 662,646; 1,038,413, and 444,975. Average production of the desirable and intermediate forage species would increase on the brush type vegetation where chemicals were applied from 129 and 258 pounds per acre on poor and fair condition rangeland respectively to 687 and 797 pounds per acre. Production on rangeland in poor condition which was mechanically treated and seeded would increase from 129 to 1,109 pounds per acre. The percent of the total vegetative ground cover comprised of desirable and intermediate forage species would increase on the brush type vegetation where chemicals were applied from 28 and 35 percent for poor and fair condition to 52 and 78 percent respectively. On rangeland in poor condition which was mechanically treated and seeded the increase would be from 28 to 84 percent.

Enhancement of Other Resource Values (EORV) Alternative

Vegetation would be disturbed at the location of the proposed rangeland improvements. These areas would amount to 826 acres in the short-term and 132 acres in the long-term that would be occupied by the rangeland improvement.

Under the EORV Alternative, the short-term consumption of forage would be reduced approximately 40 percent from the anticipated stocking rate shown for the PA. Assuming a proper use of 50 percent under the PA, this reduction in stocking would reduce the use on the forage species to about 30 percent or a light grazing intensity.

Dickson, et al. (1948) report studies show that after six years, light grazed pastures have 30 percent more cover than heavy grazed pastures. Martin (1972) comparing use zones in a pasture indicate that if the whole pasture were like the heavy use zone the stocking rate would have been 26 animal units. If the whole pasture were like the medium or light use zone it would have carried 32 or 40 animal units respectively. Composition on the heavy zone utilized at 69 percent, the medium zone utilized 50 percent and the light utilized 26 percent was 6.6, 143, and 14.6 respectively.

Comparison area studies (in the Las Cruces District) show under a light intensity of grazing, vegetative ground cover was 87 percent more and litter accumulation 44 percent more than on an adjacent area grazed at heavy intensity (BLM 1973).

The projected changes in production and percent of the total ground cover comprised of desirable and intermediate forage species and percent vegetative ground cover are shown in Table 3-9. The projected changes in each ecological condition class and forage value class which would occur as a result of the projected changes in species composition are shown in Table 3-10.

The projected changes are based on the intensity of use under the EORV Alternative compared with the PA and the ELG Alternative. The intensity of use is near the mid-point between these two. Based on the potential for improvement resulting from the existing plant species composition for each SWA the projected change would approximate half the difference between the projected change for the PA and the ELG Alternative.

Threatened or Endangered Plant Species. Areas where threatened or endangered plants occur would be identified and avoided where adverse impacts would occur from rangeland improvements and vegetation treatments.

Summary. Under the EORV Alternative, the acres in each ecological condition class would change from 1,453,369; 660,347; and 32,318 for poor, fair, and good respectively to 833,026; 1,074,226; and 238,782. The acres in each forage value class would change from 1,196,844; 668,855; and 280,305 for poor, fair, and good respectively to 662,646; 1,038,413; and 444,975. Average production of the desirable and intermediate forage species would increase on the grass type vegetation from 270; 375; and 483 pounds per acre on poor, fair, and good condition rangeland respectively to 496; 532; and 625 pounds per acre. Average production of the desirable and intermediate forage species on brush type vegetation would increase for the three condition classes from 129; 258; and 300 to 317; 377; and 383 and on the pinyon-juniper type from 337; 372; and 742 to 506; 557; and 821 pounds per acre. The percent of the total vegetative ground cover comprised of desirable and intermediate forage species would increase on grass type vegetation from an average of 41; 56; and 68 for poor, fair, and good condition to 73; 78; and 79 percent respectively. The increase on brush type vegetation would be from 28; 35; and

TABLE 3-9

AVERAGE PRODUCTION AND PERCENT TOTAL VEGETATIVE GROUND COVER[a/]

ENHANCEMENT OF OTHER RESOURCE VALUES ALTERNATIVE

Dominant Vegetation	Grass			Brush			Pinyon-Juniper		
Present Ecological Condition	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
Production in pounds per acre of desirable and intermediate forage species									
Existing	270	375	483	129	258	300	337	372	742
Projected	496	532	625	317	377	383	506	557	821
Percent of total vegetative ground cover comprised of desirable and intermediate forage species									
Existing	41	56	68	28	35	36	46	58	62
Projected	73	78	79	49	55	50	63	76	80
Percent total vegetative ground cover									
Existing	19	19	20	17	18	18	23	24	17
Projected	27	24	22	22	22	20	28	29	20

Source: Las Cruces District BLM Inventory Data, 1980.

Notes: a/From Data in Appendix B-6.

TABLE 3-10

PROJECTED ACRES FOR EACH ECOLOGICAL CONDITION AND FORAGE VALUE CLASS BY RANGE SITE

ENHANCEMENT OF OTHER RESOURCE VALUES

	Ecological Condition			Forage Value		
Range Site	Good	Fair	Poor	Good	Fair	Poor
Southern Desert MLRA 42						
Gravelly	101,925	391,605	80,076	93,021	382,296	98,289
Deep sand	2,722	14,129	30,134	4,937	18,409	23,639
Sandy	10,398	179,066	365,221	22,388	168,082	364,215
Loamy	748	30,174	32,117	6,544	39,638	16,857
Shallow sand	964	64,404	110,298	11,415	80,296	83,955
Draw	22,214	11,415	8,809	22,258	11,528	8,652
Bottomland	1,153	10,647	22,580	3,422	14,406	16,552
Limestone hills	9,445	43,123	23,350	30,968	30,854	14,096
Clayey	14,862	9,214	1,838	846	21,546	3,522
Gravelly sand	4,543	70,524	21,044	3,630	48,190	44,291
Igneous hills	28,995	116,819	24,154	98,275	53,059	18,634
Gravelly loam	4,871	33,300	26,626	5,832	21,823	37,142
Salt flats	15,432	4,902	6,224		20,351	6,207
Malpais	1,656	52,225	67,550	16,033	38,200	67,198
Subtotal	219,928	1,031,547	820,021	319,569	948,678	803,249
Western Plateau MLRA 36						
Gravelly	2,296	8,812	2,731	5,867	7,206	766
Hills	7,368	17,349	8,818	23,735	7,314	2,486
Loamy	1,433	1,855	62	3,203	70	77
Breaks	4,071	7,698	894	12,090	572	1
Bottomland		37				37
Clayey		122		23	99	
Basalt hills	3,686	6,719	500	10,299	606	
Sandy		87		87		
Subtotal	18,854	42,679	13,005	55,304	15,867	3,367
TOTAL	238,782	1,074,226	833,026	374,873	964,545	806,616

Source: BLM Las Cruces District Inventory Data, 1980.

36 to 49; 55; and 50, and on the pinyon-juniper type from 46; 58; and 62 to 63; 76; and 80 percent respectively for poor, fair, and good condition.

Under the EORV Alternative, vegetation would be disturbed or destroyed on 826 acres in the short-term and 132 acres in the long-term as a result of the proposed rangeland improvements and the associated construction activities.

Soils

Two kinds of impacts to the soil resource would result from the PA and alternatives. Direct impacts such as those resulting from construction of rangeland improvements (dirt tanks, wells, fences, pipelines, erosion dikes, etc.), whether short-term or long-term impacts, are relatively easy to determine. Indirect impacts (e.g., changes in grazing intensities which alter the vegetative resource, runoff volumes, and eventually erosion) are much more difficult to assess and quantify.

When assessing impacts for such large areas as the SRGPA, several assumptions must be made for each of the units (range sites) discussed:

1. Areas of each range site contain very similar soil types, vegetative types, percentage ground covers, topography, land use, and erosion condition.

2. Predicted changes in vegetative ground covers (taken from Appendix B-6) apply to all areas of each range site.

3. No changes in sediment yields would occur where there is no expected changes in runoff rates from the areas.

4. Expected changes in livestock numbers (land use) would be uniform throughout the Planning Area.

Proposed Action (PA)

Under the PA, the 14 percent reduction in livestock numbers from the present 5-year average would reduce sediment yields from some range sites as much as 13 percent in the long-term. Table 3-11 shows the range sites which would have decreased sediment yields under the PA and alternatives. Areas of the sandy, deep sand, shallow sandy, clayey, bottomland, and salt flats range sites would not have significant changes in sediment yields because of nearby level slopes or they consist of soils with very rapid infiltration rates which do not allow water to runoff from these sites under present climatic conditions.

The construction of the proposed rangeland improvements would disturb soils on 734 acres in the short-term. Additional acreages of soil disturbance caused by livestock concentrations around new waters would occur (especially on fine-textured soils). Soil erosion would

TABLE 3-11

ESTIMATED SEDIMENT YIELDS

Range Site, MLRA and Acres Affected	Estimated Sediment Yields (acre-feet/square mile/year)					
	Existing Environment	Proposed Action	No Action	Elimination of Livestock Grazing	Maximization of Livestock Forage Production	Enhancement of Other Resource Values
Southern Desert						
Gravelly (573,606)	0.64	0.57	0.64	0.46	0.57	0.50
Loamy (63,039)	0.30	0.27	0.30	0.20	0.27	0.25
Draw (42,438)	0.21	0.20	0.21	0.14	0.20	0.18
Hills (245,886)	0.62	0.55	0.62	0.45	0.55	0.50
Gravelly sand (96,111)	0.87	0.80	0.87	0.62	0.80	0.75
Gravelly loam (64,797)	0.45	0.42	0.45	0.29	0.42	0.37
Malpais (121,431)	0.24	0.22	0.24	0.17	0.22	0.20
Western Plateau						
Gravelly (13,839)	0.42	0.38	0.42	0.28	0.38	0.33
Hills (33,535)	0.50	0.45	0.50	0.34	0.45	0.41
Loamy (3,350)	0.32	0.29	0.32	0.20	0.29	0.27
Breaks (12,663)	0.62	0.55	0.62	0.43	0.55	0.51
Basalt hills (10,905)	0.53	0.46	0.53	0.37	0.46	0.43

Source: BLM Las Cruces District EIS Team Files, 1980.

increase on these disturbed areas because of reduced infiltration rates and moisture capacities of the disturbed soils, but erosion rates would be insignificant to total sediment produced from any given area.

The proposed chemical treatments on 29,772 acres of mesquite dune areas in the sandy and deep sand range sites could increase wind erosion in the short-term on these areas because of the reduced shrub canopy cover. The amount of soil lost from these sites would decrease once vegetation becomes reestablished because of the decreased amount of exposed soil. Studies on sprayed mesquite dune areas on the Jornada Experimental Range (Herbel et al, 1972) showed approximately 81 percent less wind blown soil collected 600 feet within sprayed areas as compared to adjacent unsprayed areas. Similar results are expected where spraying is conducted on public land. A leveling of the dunes and deposition of soil in the interdune areas could also be expected once the mesquite shrubs have been successfully reduced or eliminated.

Chemical treatments of 9,705 acres of creosote in gravelly and gravelly loam range sites could increase soil erosion by water in the short-term, but when vegetation becomes reestablished, these sites would not contribute a significant amount of sediment to any of the surface water basins.

Mechanical treatments on 600 acres of cholla on loamy sites of the Western Plateau MLRA would disturb the soil in areas where the plants are removed until vegetation becomes reestablished. The changes in soil erosion rates as a result of these activities would not be significant.

Summary. Under the PA, soils would be disturbed on 114 acres in the long-term where range land improvements are constructed under the PA. Sediment yields would be reduced as much as 13 percent on some range sites. However, this would vary from range site to range site. Soil erosion by wind would be expected to decrease on 29,772 acres of mesquite spray areas, but cannot be quantified.

No Action (NA) Alternative

Under the NA Alternative, areas would continue to deteriorate where the soil resource is deteriorating and would continue to improve where the soil resource is improving (assuming no major changes in climate, stocking rates, construction activities, etc.).

Areas of the gravelly sand, gravelly, hills, breaks, and gravelly loam range sites would continue to have the highest estimated yields per unit area, whereas the bottomland, salt flats, and sandy range sites would continue to have the lesser sediment yields per unit area. (Table 3-11)

Soil series making up the sandy, deep sand, and shallow sandy range sites would continue to be most susceptible to wind erosion.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, all livestock would be removed from public land, therefore, further soil disturbance resulting from livestock grazing would be eliminated.

On some sites, sediment yields would be decreased an estimated 0 to 39 percent (Table 3-11). No significant decreases are expected on sites with nearby level slopes or with soils with very rapid infiltration rates where runoff rates would not change.

Sandy textured soils of the sandy, deep sandy and shallow sandy range sites would continue to be most susceptible to wind erosion.

In summary, sediment yields would decrease as much as 39 percent on some sites in the long-term.

Maximization of Livestock Forage Production (MLFP) Alternative

The expected 14 percent reduction in livestock numbers from the present 5-year average along with the increased acres of vegetation treatments under this alternative would reduce sediment yields as much as 13 percent on some range sites in the long-term. Table 3-11 shows the sites which would experience decreased sediment yields under the MLFP Alternative. Areas of the sandy, deep sand, shallow sandy, clayey, bottomland, and salt flats range sites would not have significant changes in sediment yields because of nearby level slopes or they consist of sandy soils with rapid infiltration rates where there is no runoff.

The construction of rangeland improvements would disturb soils on 1,067 acres in the short-term and 163 acres in the long-term (see Appendix E-5). Under the MLFP Alternative, 203 erosion control dikes would be built which would decrease the amount of sediment reaching the basins, but the amount would not be significant. Soil disturbance caused by livestock concentration around new waters would be greater than under the PA because of the increased number of livestock. Soil erosion would increase on these disturbed areas because of reduced infiltration rates and moisture capacities of the disturbed soils, but erosion rates would be insignificant to total sediment produced from any given area.

Chemical spray treatments would be conducted on 391,318 acres of mesquite on the sandy and deep sand range sites. These areas could experience a slight increase in soil erosion by wind until vegetation becomes reestablished, whereby soil moved by wind would decrease assuming similar results from similar treatment areas on the Jornada Experimental Range where 81 percent less soil was collected in treated areas as opposed to untreated areas (Herbel et al, 1972).

Chemical treatments on 381,203 acres of creosote on the gravelly and gravelly loam range site could increase water erosion in the short-term, but no significant long-term impacts would occur as a result of these treatments.

The soil surface would be disturbed where mechanical treatments are conducted on 24,683 acres of creosote, tarbush and cholla on loamy and gravelly loam sites. The areas would then be reseeded and the removed shrubs would be placed back on the soil surface to provide protection to the soil against wind erosion and raindrop impact which could wash away the loosened topsoil or seal the soil surface. It would also "shade" the soil surface which preserves soil moisture and allows for a more optimum temperature for seedling emergence. Once vegetation becomes reestablished (after 1 to 3 years from treatment) no significant changes in sediment yields from these areas would occur.

Summary. Under the MLFP Alternative, the construction of rangeland improvements would disturb soils on 1,067 acres in the short-term and 163 acres in the long-term. Wind erosion would decrease on 391,318 acres of mesquite spray areas, but cannot be quantified. No significant long-term changes in sediment yields would be expected from the creosote spray areas or mechanical treatments. Sediment yields would be decreased as much as 13 percent on some sites as a result of the MLFP Alternative. Other sites would not be affected.

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, soils would be disturbed on 826 acres in the short-term and 132 acres in the long-term where facilities are constructed for rangeland improvements. Additional acreages of soil disturbance caused by livestock concentrations around new waters would occur (especially on fine-textured soils). Soil erosion would increase on the compacted areas because of reduced infiltration rates and moisture capacities of the compacted soils, but erosion rates would be insignificant to total sediment produced from any given area.

Under the EORV Alternative, the same amount of AUMs would be available as in the PA, except for further reductions occurring on areas in poor and fair ecological condition. As a result, sediment yields would be reduced from 0 to 27 percent, depending on the particular range site. Range sites and expected sediment yields are shown in Table 3-11. Changes in sediment rates would not occur on the sandy, deep sand, shallow sandy, bottomland, clayey or salt flats range sites which occur on nearby level slopes.

As under the PA, vegetation treatments on 40,077 acres would increase soil erosion by wind and water until vegetation becomes re-established. In the long-term erosion rates would be insignificant.

Summary. Soils would be disturbed on 826 acres in the short-term and 132 acres in the long-term where rangeland improvments are constructed. Sediment yields would be reduced 0 to 27 percent, depending on range site because of reduced grazing. No significant long-term impacts would result from treatment areas.

Wildlife

The analysis in this section is directed toward impacts to wildlife habitats, specifically Standard Habitat Sites (SHS's), rather than an attempted analysis of impacts to wildlife species or groups of species known to occur in the Planning Area. As in Chapter 2, big game is discussed in relation to SHS's and separately in relation to herd units (Map 2-2). Impacts to raptors are analyzed separately because they are not easily related to SHS's. (See Appendix D-3 for Methodology.)

When a wildlife component (e.g., SHS, deer, etc.) is not discussed under the Proposed Action (PA), the impacts are assumed to be insignificant. When a wildlife component is discussed under the PA, but is not discussed under an alternative, the impacts are expected to be the same as the PA.

Proposed Action (PA)

Under the PA, the quality of habitats available to vertebrate wildlife species would change in ecological condition, and generally provide more space, cover, food, and water. Specific changes likely to occur in habitats and wildlife communities are analyzed by SHS's and groups as discussed in Chapter 2. Changes predicted for communities are analyzed by comparing data between different ecological condition classes, although a change by one ecological condition class is not anticipated for all sites. Changes in production of desirable and intermediate shrub species is based on improvement of ecological condition by 10 points on a 100 point scale. (See Appendix B-2 for Methodology.)

Riparian. Specific changes are difficult to predict for this SHS because of type variability and a small sample of fair and good condition areas for comparison. Because of the documented tendency of livestock to concentrate in zones of riparian vegetation, improvement is unlikely to occur in riparian habitats under the PA unless the riparian grazing treatment (discussed in Chapter 1) is adopted and specific monitoring and management design for each site is carefully and adequately planned. Platts (1979) reports that one riparian area rested from livestock use for 4 years returned to pre-rest conditions within 6 weeks after cattle re-entered the area, a loss of 35 percent improvement. The proposed monitoring program would provide an opportunity to correct abuse of the limited riparian sites.

The riparian SHS is second in importance to doves and would be expected to increase in dove production with improvement in ecological condition.

The New Mexico Department of Game and Fish Comprehensive Plan (in print) states that waterfowl use of Caballo Lake is increasing. Associated with increasing waterfowl use of Caballo Lake, there has been an increase in waterfowl use of farms in the Las Uvas and Hatch Valleys. A further increase in waterfowl use of Caballo Lake is desirable with as little crop depredation as possible. Under the PA, crop depredation in the Las Uvas and Hatch Valley is likely to increase.

Pseudoriparian. Diversity of plant species would increase in this SHS, as would structural diversity under the PA, based on improvement by one ecological condition class, as indicated on Table 3-12. Production of desirable and intermediate shrub species would increase from the present average of 5.8 pounds per acre to an estimated 12 pounds per acre. As shown on Table 3-13, the diversity of summer birds would increase in this SHS as ecological condition improves. Sampling was inadequate to determine changes in small mammal diversity. There appears to be a tendency to locate water developments in or near pseudoriparian habitats. Livestock also seem to display a tendency to concentrate in pseudoriparian habitats as in riparian. Locations of waters and concentrations of livestock could prevent improvement in the ecological condition on much of this SHS. An increase in production of desirable and intermediate shrubs should provide improved habitat for deer and Gambel's quail. The increase in structural diversity would provide improved dove habitat.

Grass Rolling Upland. Under the PA, the diversity of vegetation species would increase slightly. The primary change in structural diversity appears to be a decrease in the under 1 foot level and a substantial increase in the 1-3 foot level; implying improved cover for wildlife. Production of desirable and intermediate shrub species would increase from 14.5 to 15.9 pounds per acre, supporting the implication of improved cover for wildlife. Structural diversity would also increase in the over 3 foot levels which, although slight, might be detrimental to pronghorn. Small mammal and summer bird diversity would increase with an improvement in ecological condition class. The increase in wildlife cover should be beneficial to scaled quail.

Grass Flat. Plant species diversity would increase slightly in this SHS, primarily in the levels below 3 feet. Production of desirable and intermediate shrub species would be reduced from the present 86 to an estimated 72 pounds per acre. The present and future shrub production, as analyzed, is much higher than the other SHS's which is apparently caused by inclusion of sites with high levels of production of fourwing saltbush. As ecological condition is improved, summer bird diversity would increase while small mammal diversity would decrease. Big game use is unlikely to change significantly from the present low levels. The most significant change would be an improvement in habitat for those species requiring dense grass cover.

TABLE 3-12

EFFECTS OF PROPOSED ACTION ON HABITAT DIVERSITY

	PLANT SPECIES DIVERSITY INDEX			STRUCTURAL DIVERSITY											
				0-1 FT			1-3 FT			3-7 FT			7 FT AND OVER		
STANDARD HABITAT SITE	PRESENT	IMPROVED	CHANGE	PRESENT	IMPROVED	CHANGE	PRESENT	IMPROVED	CHANGE	PRESENT	IMPROVED	CHANGE	PRESENT	IMPROVED	CHANGE
Riparian	.0610	ND	ND	.826	ND	ND	.1136	ND	ND	.0592	ND	ND	.0006	ND	ND
Pseudoriparian	.0730	.0878	+	.689	.532	-	.251	.4497	+	.059	.018	-	.007	0.0	-
Grass rolling upland	.0478	.0546	+	.6985	.546	-	.3013	.453	+	.0006	.002	+	0	0	0
Grass flat	.0457	.0466	+	.654	.644	-	.285	.354	+	.063	.0013	-	0	0	0
Grass mountain	.0669	.0585	-	.672	.839	+	.325	.238	-	.0030	.0036	+	0	0	0
Mixed shrub rolling upland	.0611	.0764	+	.748	.7605	+	.242	.238	-	.009	.0012	-	0	ND	ND
Mixed shrub mountain	.1005	ND	ND	.581	ND	ND	.355	ND	ND	.034	ND	ND	0	ND	ND
Mesquite rolling upland	.0567	.0422	-	.825	.999	+	.134	.0002	-	.040	.0013	-	.003	0	-
Half-shrub rolling upland	.0594	.0830	+	.972	.721	-	.012	.042	+	.0013	.004	+	.0008	ND	ND
Pinyon juniper grass mtn.	.0673	.0569	-	.7968	.928	+	.2284	.2815	+	.0104	.0019	-	.0012	.0005	-
Malpais	.0669	.0641	-	.824	.998	+	.176	.003	-	0	0	0	0	0	0
Creosote rolling upland	.0517	.0658	+	.894	.860	-	.094	.135	+	.012	.005	-	0	0	0
Creosote breaks	.0612	.0622	+	.836	.842	+	.142	.152	+	.021	.0046	-	0	0	0
Mesquite sand dunes	.0573	.0545	-	.3788	.956	+	.0568	.039	-	.0643	.005	-	0	0	0

Source: BLM Las Cruces District Office Inventory Files, 1980.

Notes:
+ = Increase in plant species diversity.
0 = No change in plant species diversity.
- = Decrease in plant species diversity.
ND = No data or insufficient data for projection of change.

TABLE 3-13

EFFECT OF ECOLOGICAL CONDITION CLASS CHANGE BY 10 POINTS ON STANDARD HABITAT SITES

		Existing Estimated Percent by Condition Class			Percent by Condition Class Improved 10 Points			Estimated Annual Shrub Production Pounds Per Acre Desirable and Intermediate Species						Diversity Index by Ecological Condition					
														Summer Birds			Small Mammals		
Standard Habitat Sites	Acres	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good	Present Average	10 Point Improvement Average	Production Change	Poor	Fair	Good	Poor	Fair	Good
Riparian a/	13,642	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.710	1.515	1.753	0.750	ND	ND
Pseudoriparian	43,270	56	37	7	38	62	ND	4.7	19.5	ND	8	12	+	2.020	2.043	2.228	1.677	ND	ND
Grass rolling upland	218,451	52	36	12	28	52	20	9.6	17.7	6.4	14.5	15.9	+	1.765	1.866	ND	2.000	1.336	ND
Grass flat	159,671	79	16	5	55	32	13	98.5	48.5	14.9	86.3	72.5	-	1.439	1.616	ND	1.461	1.556	ND
Grass mountain	107,178	45	44	11	21	60	19	15.2	11.8	12.8	13.4	12.8	-	ND	1.382	1.543	1.155	1.134	1.423
Mixed shrub rolling upland	75,741	59	39	2	35	55	10	29.6	27.3	18.6	28.5	12.5	-	1.500	1.491	ND	1.021	0.707	ND
Mixed shrub mountain	58,516	42	51	7	19	68	13	31.7	27.4	57.6	30.8	35.8	+	ND	1.499	ND	ND	1.000	ND
Mesquite rolling upland	113,622	82	18	0	58	34	8	39.8	1.2	ND	32.9	23.8	-	1.636	1.397	ND	1.016	1.069	ND
Half-shrub rolling upland	214,113	74	26	0	50	42	8	12.9	11.7	ND	12.6	6.6	-	1.990	1.565	ND	0.985	1.279	ND
Pinyon-juniper grass mountain	50,702	38	50	12	15	66	19	24.3	13.3	28.2	18.8	18	-	1.367	ND	ND	0.750	0.726	ND
Malpais	35,250	63	37	0	39	53	8	21.6	12.0	ND	18.1	15	-	0.870	ND	ND	1.291	ND	ND
Creosote rolling upland	995,290	71	29	0	47	45	8	6.2	12.4	ND	8.0	8.6	+	1.959	1.760	ND	1.026	1.386	ND
Creosote breaks	154,042	65	35	0	41	51	8	5.5	15.7	ND	9.1	10.4	+	2.110	1.474	ND	ND	ND	ND
Mesquite sand dune	669,188	88	12	0	64	28	8	32.3	28.4	ND	31.8	28.9	-	1.560	1.890	ND	.829	1.342	ND

Source: BLM Las Cruces District Inventory Files, 1980.

Notes: a/Variability in sites and sample size make comparisons difficult.

+ = Increase
- = Decrease
ND = No Data

Grass Mountain. Under the PA, structural diversity of the plant community would decline, with an increase in the under 1 foot category. Production of desirable and intermediate shrubs would also decline from the present 13 pounds per acre to about 12.8 pounds per acre. From the inventory data, this SHS is fourth in importance to deer. The reduction in shrub production and lowered structural diversity indicates that this SHS would support fewer deer under the PA than under existing conditions. Data for summer bird diversity is not available for this SHS on poor ecological condition sites. However, diversity increases for summer birds between fair and good sites. Small mammal diversity would decline in this SHS with an increase in ecological condition. Overall, grassland wildlife species, including pronghorn, would be favored under the PA in this SHS. No scaled quail observations were recorded on sites in poor condition in this SHS, whereas the greatest number of scaled quail observations on fair condition sites was in this SHS.

Mixed Shrub Rolling Upland. Both plant species and structural diversity would increase in this SHS under the PA. Production of desirable shrub species would decline from the present estimated 28.5 pounds per acre to about 27.5 pounds per acre, implying a slight reduction in carrying capacity for deer. The inventory data indicates a reduction in shrubs as grass is favored. Summer bird diversity would decline slightly as ecological condition improves. The sample size of small mammals in different ecological condition classes is inadequate for clear comparisons but indicate a decline would occur in small mammal diversity with improving ecological condition. This SHS provides a significant amount of scaled quail use (Table 2-10) which should increase with an improvement in ecological condition.

Mixed Shrub Mountain. As shown on Table 2-10 this SHS is very important to deer in the Planning Area. Under the PA, production of desirable and intermediate shrub species would increase from the present estimate of 30.75 pounds per acre to about 35.75 pounds per acre. Available data are insufficient to estimate changes in plant species diversity or structural diversity. Inventory data are inadequate to estimate changes in bird or small mammal diversity. Some scaled quail use of this SHS (7 percent) was reported during the inventory and would be expected to increase under the PA.

Mesquite Rolling Upland. Changes in this SHS are difficult to predict because of conflicting data. This SHS, depending on soils, appears to be intermediate between grass rolling upland and either creosote rolling upland or mesquite sand dune. American Ag International, Inc. (1979) reports that this SHS would continue to deteriorate in ecological condition from the grassland aspect, even under complete protection from livestock grazing. If improvement in ecological condition is possible through grazing management, the PA would result in reduced plant species diversity with a significant increase in structural diversity under the 1 foot level. Other levels would decrease in structure. Production of desirable and intermediate shrub species would decline from the present estimate of 32.86 pounds per acre to about 23.75 pounds per acre. Summer bird diversity would decline as grassland species are favored while small mammal diversity would increase for the same reason. The inventory records show the highest percentage of scaled quail observations (21 percent) occur in this SHS. Improvement in ecological condition with a reduction in shrub cover would imply a reduction in scaled quail. A significant number of pronghorn observations were recorded in this SHS. The affect of the PA on pronghorn is uncertain. While shrubs are reduced, which would favor pronghorn, plant diversity is also reduced, implying a less dependable food supply.

Half-Shrub Rolling Upland. Broom snakeweed populations, the dominant aspect plant in this SHS, are cyclic. On sites without mesquite as a component of the vegetation, reduced livestock grazing as well as cyclic reduction in broom snakeweed would change the aspect to a grass rolling upland SHS. However, if mesquite occurs in a site, the changes would be the same as in the mesquite rolling upland SHS (American Ag International, Inc. 1979).

On sites without mesquite, improvement by one ecological condition class would result in a significant increase in both plant species and structural diversity. However, production of desirable and intermediate shrub species would decline slightly from the present 12.6 to about 7 pounds per acre as grass is favored. Summer bird diversity would decline, while small mammal diversity would increase. A small number of deer observations were recorded in this SHS. With an improvement in ecological condition, deer use would probably decline, but the SHS would become more suitable for pronghorn. The percentage of Gambel's quail observations in this SHS was third of all SHS's (the same as grass rolling upland). Improvement would likely result in less use by Gambel's quail as shrubs decline and grass is favored.

Pinyon-Juniper Grass Mountain. Improvement in ecological condition in this SHS would reduce structural diversity in the over 3 feet categories, while increasing structural diversity in the vegetation that is less than 3 feet. Overall structural diversity would decline. The changes apparently would be the result of fewer pinyon and juniper trees and other shrubs, including browse species, with an increase in grass and low growing browse. Overall, browse production would decline from about 18.75 to 18 pounds per acre, supporting the expected changes in structure. There would be a slight decline in carrying capacity for deer. Inventory data are inadequate to predict changes in summer bird or small mammal diversity. As ecological conditions improve, bird species reliant on pinyon-juniper canopy habitat would probably decline.

Where tree canopy exceeds 30 percent, improvement in ecological condition would be improbable without either fire or mechanical reduction of the canopy (American Ag International, Inc. 1979). This type is apparently second in importance to deer and cover would remain adequate, although there would be a reduction in shrub production.

Malpais. The limited number of sites reviewed which were in good or fair ecological condition makes predictions difficult for this SHS. Production of desirable and intermediate shrub species would decline from the estimated present 18.1 to 16.1 pounds per acre. No comparison data are available for summer bird or small mammal diversity. The tendency in this SHS with improvement in ecological condition would seem to be a decline in shrubs and an increase in grass.

Creosote Rolling Upland. Based on the information reviewed, improvement in this SHS by one ecological condition class would provide a very slight increase in structural diversity and overall plant species diversity, implying that only minor changes would occur in the value of the creosote rolling upland habitat for wildlife populations. Summer bird diversity would decline slightly, while small mammal diversity would increase. Production of desirable and intermediate shrub species would increase from about 8 to about 9.2 pounds per acre. The improvements projected above would imply better habitat for scaled quail. This SHS was second in percentage of scaled quail observations during the inventory.

An exception to the above expected changes in the creosote rolling upland SHS would be the land proposed for chemical treatment, less than 1 percent of the SHS. Although there is little data available on which to base expected effects on wildlife populations, there would be a decrease in composition of creosote and an increase in plant species diversity. Increased ground cover could increase use of the SHS by scaled quail. Areas that would be chemically treated, depending on the effectiveness of treatments, would possibly be converted to a grass rolling upland SHS, the habitat preferred by pronghorn (American Ag International, Inc. 1979). However, the size and locations of the proposed treatment areas would generally preclude significant increases in available pronghorn habitat.

Creosote Breaks. Creosote is believed to be a dominant plant in the climax vegetation on this habitat type, and the possibility of improvement in this SHS would be questionable due to past soil erosion (American Ag International, Inc. 1979). Production of desirable and intermediate shrub species would increase from about 9 to 10.4 pounds per acre under the PA. Summer bird diversity would apparently decline significantly with improvement in ecological condition, according to the inventory data.

Mesquite Sand Dunes. Comparison of poor ecological condition and fair ecological condition mesquite sand dune habitat sites indicate that under the PA there would be a substantial increase in the structural diversity in the 0-1 foot level, some reductions in the 1-7 foot level, and a decline in overall structural diversity. The comparisons also imply a decline in plant species diversity. Production of desirable and intermediate shrub species would decline from about 32 pounds per acre to about 28.9 pounds per acre. Even if protected from grazing, the mesquite sand dune SHS would not change appreciably for a long period of time, precluding the changes predicted above (American Ag International, Inc. 1979).

The majority of the proposed chemical treatment of mesquite with Dowco 290 or Graslan would occur in the mesquite dune SHS. Mesquite kill in the treatment areas would vary, but it would be unlikely to change the SHS from a mesquite dune aspect by 2010. However, dune leveling would occur and interspace ground cover would increase to provide better habitat for grassland associated species. Where mesquite treatment areas are in or adjacent to occupied pronghorn habitat, the treatments could result in improved habitat conditions for pronghorn. The chemical treatments would apparently result in improved ecological condition. In this SHS, both summer bird diversity and small mammal diversity would increase with improvement in ecological condition. The inventory data indicates that scaled quail populations would decline with an improvement in ecological condition.

Big Game. An analysis of the production of desirable and intermediate shrub species by SHS indicates that the expected AUM allocations as shown in Figure 1-1 for both livestock and wildlife would be more than sufficient to provide for optimum populations of deer and pronghorn in the short-term. However, analysis also indicates that the long-term AUM allocations shown on Figure 1-1 would not provide sufficient forage for optimum big game populations. The analysis was based on production of desirable and intermediate shrubs and did not include considerations such as preference or availability. Only the proposed monitoring program would provide the final answer. The primary reason why the long-term allocation would be insufficient is the reductions in shrub production in some SHS's with improving ecological condition. Comparison of vegetation data between poor, fair, and good ecological condition sites for the pinyon-juniper grass SHS indicates that desirable and intermediate shrub production is 28.18 pounds per acre in good condition, 13.29 pounds per acre in fair condition, and 24.34 pounds per acre in poor condition. The lowest production is in fair condition, and under the PA, a higher percentage of the pinyon-juniper grass SHS would be in fair condition than at present, which would result in the lowest production of desirable and intermediate shrubs. Although the sample size of good condition sites is small, the inventory data does suggest that in two major deer habitats, mixed shrub mountain and pinyon-juniper grass mountain, big game forage production would decrease under the PA.

Other limiting factors may prevent optimum populations from being realized (see assumption 6). Pronghorn would be unlikely to reach optimum populations (Table 3-14) because of limited amounts of preferred habitat types within the herd unit areas (Map 2-2) and a probability of continuing brush density increases in marginal habitats (American Ag International, Inc. 1979), even with implementation of the PA. Buechner (1950) states that low brush or mesquite "trees" are not a serious handicap for pronghorn. However, Yoakum (1978) states that rangelands with vegetation exceeding 30 inches in height are used only infrequently by pronghorn. All of the marginal pronghorn habitat types in the Planning Area contain vegetation components over 30 inches high, including mesquite. Areas of chemical vegetation treatment in pronghorn herd unit White

TABLE 3-14

PROJECTED BIG GAME POPULATIONS BY HERD UNITS[a]

Herd Unit Species	Present[b] Population	Proposed[c] Action	No Action[d]	Elimination of[e] Livestock Grazing	Maximization[f] of Livestock Forage Production	Enhancement of[g] Other Resource Values
Deer						
White Sands (WHSD)	1,120	2,475	1,120	4,580	2,475	2,475
Gila (GILA)	191	639	191	1,110	639	639
Magdalena (MAGD)	12	12	12	16	12	12
Deming (DEMG)	40	97	40	1,270	97	97
Total	1,363	3,223	1,363	6,976	3,223	3,223
Pronghorn						
Nutt (NUTT)	50	50	50	50	102	50
White Sands (WHSD)	238	253	238	253	667	253
San Mateo (SANM)	97	97	97	97	240	97
Las Uvas (LAS UVAS)[h]	0	50	50	50	50	50
Total	385	450	435	450	1,059	450

Source: BLM Las Cruces District EIS Team Files, 1980 and New Mexico Department of Game and Fish (NMDG&F), 1980.

Notes: a/Entire herd unit area within BLM allotments regardless of land status. Assumes improving rangeland condition on entire area.
b/NMDG&F figures.
c/Optimum Population Numbers from NMDG&F for deer. Pronghorn below optimum because of brush.
d/Same as present population. No improvement in rangeland condition.
e/For deer, Soil-Vegetation Inventory Method forage production estimated for herd units, the assumed improvement in rangeland condition from Figure 1-1. Assumes brush limiting for pronghorn.
f/Deer same as Proposed Action with improvement in rangeland condition and proper use by livestock. Pronghorn increase with brush control.
g/Enhancement of Other Resource Values same as Proposed Action, based on rangeland improvement by one ecological condition class.
h/Las Uvas unit for pronghorn not mapped. Reintroduction effort by NMDG&F assumed.

Sands (WHSD) 21, depending on effectiveness of the treatments, would provide considerably improved habitat for pronghorn. The types that would be treated are creosote rolling upland, mesquite rolling upland, and mesquite sand dune. The treatment areas border a grass flat. Conversion of the shrub types to a grass rolling upland SHS would create an improved interspersion of habitat types. The value of the treated areas would also depend on the abundance of valuable forage plants remaining after chemical treatments, especially browse and perennial forbs. Very little information is available on which to evaluate chemical effects on forage species important to pronghorn. The chemicals proposed for use are relatively nonselective on broad leaf plant species.

Achievement of optimum populations of both deer and pronghorn could be affected by grazing treatments to be implemented on 70 allotments. Grazing treatment affects cannot be analyzed without site-specific information on type and arrangement of treatments proposed for each allotment.

Generally, water developments would benefit deer and pronghorn, provided new waters are not located in a site which could cause livestock concentrations in habitats which provide cover or other important habitat components.

Raptors. The PA would change some of the half-shrub rolling upland, mesquite rolling upland, and creosote rolling upland habitat sites toward a grassland aspect and would reduce the small mammal prey base for raptors. The small mammal diversity in the rolling upland landform would increase. Increased ground cover could also reduce the hunting efficiency of raptors. It is unknown whether the change of one ecological condition class would reduce prey populations enough to reduce raptor populations. (A supposed increase in wildlife diversity with an upward change in ecological condition could indicate that prey specialist among raptors could benefit.) Snyder (1975) states that food supplies and nesting sites are important limiting factors for raptors, and Oldendorff et al. (1980) report on several artificial raptor perch projects being beneficial to raptors. A combination of available prey and yuccas for nest and perch sites are believed responsible for the high wintering raptor populations occurring especially in the Las Uvas Planning Unit. The PA could help maintain yuccas in the Las Uvas habitats (Warnock 1970). The effect of Graslan and Dowco 290 on yuccas is unknown, however, based on observation of chemical treatment areas on the Jornada Range, young yuccas would likely be reduced. The small acreage proposed for chemical treatment could result in improved raptor habitat by creating edge.

Threatened or Endangered Species. Table 2-9 summarizes occurrences or suspected occurrences of federal and state listed wildlife species in the Planning Area by SHS. Of the 19 species listed, 11 (including the olivaceous cormorant, Mississippi kite, black hawk, bald eagle, caracara, red-headed woodpecker, Bell's vireo, Sonora Mountain king snake, Mexican tetra, bluntnose shiner, and silvery minnow) are reliant on riparian or aquatic habitats. The majority of riparian habitat in the Planning Area is on Caballo and Elephant Butte Lakes. The impacts of the PA on the riparian habitat at the lakes is difficult to analyze because of the reliance on monitoring and uncertainty of monitoring of riparian habitat. If monitoring is conducted by range site without special studies for riparian sites, overuse of riparian sites would occur because of concentration of livestock in the riparian areas. The PA would probably result in a continuing decline in habitat for some of the above threatened or endangered species.

Three endangered species which are associated with grass types (peregrine falcon, Baird's sparrow, and McCown's longspur) could be benefited by the PA. Based on information given by Belfit (1979), habitat could improve for the Gila Monster (except riparian habitats) and Trans-Pecos ratsnake. The chemical vegetation treatments would essentially cause a temporary loss of habitat for the Trans-Pecos ratsnake, but increase the edge effect between shrub and grass types which appear to be abundant in habitats where this species is abundant (Belfit 1979). Sightings of wintering peregrine falcons have recently been reported in the Las Uvas Planning Unit (BLM files). The concentration of chemical pesticide residues in peregrine prey has been widely credited with peregrine declines. Information submitted to BLM by the manufacturers of both herbicides proposed for use indicate that no such problems would occur from the proposed chemical treatments. The PA would be beneficial to endangered fish species (Table 2-9) in the Rio Grande by reducing sediment load in the river.

Summary. With the exception of the riparian SHS, wildlife habitat and wildlife species would improve in diversity under the PA. Although the forage allocation to big game would be adequate for present and optimum populations (by the year 2010), the big game species may be limited by other limiting factors.

No Action (NA) Alternative

Trend data obtained during inventory of the Planning Area are inadequate to determine the impacts of the NA Alternative. The trend data that is available seems to indicate that some improvement and some decline are occurring in ecological condition. For analysis of the NA Alternative it is assumed that improvement and declining trends presently occurring are equal across the Planning Area in each SHS.

Riparian. The majority of riparian habitat sites in the Planning Area are presently in poor condition, meaning that no lower condition class is possible. However, a further reduction in points allowed for vegetation composition under the ecological condition rating system would be possible if the riparian grazing treatment (discussed in Chapter 1) is not adopted because of the tendency of livestock to concentrate in riparian areas. The NA Alternative would not provide any opportunity to reduce waterfowl depredations in the Las Uvas and Hatch Valleys.

Pseudoriparian. Inventory data indicate that this SHS may support almost 4 deer per section as well as being the primary habitat for Gambel's quail. Production data for desirable and intermediate shrub species indicates that production from desirable and intermediate shrubs is low at about 8 pounds per acre and would be reduced toward 5 pounds per acre if decline continues. There would be a potential for operator constructed waters to be located in or adjacent to this SHS which would potentially increase competition and cause a decline in diversity of summer birds from the present index of 2.402.

Grass Rolling Upland. The present existence of this SHS and the observed decline of other SHS's on the rolling upland landform once brush invasion has started indicates that there would be no change in this SHS under the NA Alternative (American Ag International, Inc. 1979). If brush invasion had started at the time of the inventory, but was insufficient to change the site from a grass aspect, this SHS would likely change to a mesquite, half-shrub or mixed shrub rolling upland site by 2010. Once begun, such changes appear to occur even with complete protection from livestock grazing. This SHS is important to scaled quail (15 percent of observations) which fluctuate drastically in population levels from year-to-year. The NA Alternative would not permit any improvement in ecological condition which, based on the inventory data, would not improve habitat conditions for scaled quail. No observations of scaled quail were reported on poor ecological condition sites of this SHS.

Grass Flat. It is assumed that most sites of this SHS would remain in their present condition under the NA Alternative. These habitats could be lost with a combination of present grazing levels and changes in water supply. Warnock (1970) reports that water control structures result in brush invasion of this type. The highest production of desirable and intermediate shrubs were found in this type on poor condition sites, 98 pounds per acre, primarily from fourwing saltbush. Such brush invasions would result in loss of habitat for species reliant on dense grass cover.

Grass Mountain. This SHS presently has a lower percentage (about 45 percent) of poor condition sites than most other SHS's and a relatively low production of desirable and intermediate shrubs. Deer use is apparently fourth heaviest. Under the NA Alternative, operator construction of new waters would have a high potential to result in new competition for forage between livestock and wildlife.

Mixed Shrub Rolling Upland. American Ag International, Inc. (1979) reported that this SHS is in a downward successional trend toward the creosote rolling upland SHS. Assuming that the creosote type would be reached by 2010, the NA Alternative would result in the loss of about 75,000 acres of habitat presently supporting an estimated 190 deer resulting in a loss of about 178 deer. The new creosote rolling upland areas would support about 12 deer at present estimated densities. Production of desirable and intermediate shrub species would be reduced from about 28 pounds per acre to about 8 pounds per acre.

Mixed Shrub Mountain. According to American Ag International, Inc. (1979) this SHS would not change to any other SHS under different grazing pressure. However, this SHS is of major importance to deer and the majority (51 percent) of the SHS is presently in fair ecological condition which is apparently the ecological condition class for the SHS in terms of production of desirable and intermediate shrub species. The NA Alternative would not provide for any increase in shrub production. New operator constructed livestock waters would likely result in new competition for forage between livestock and wildlife.

Mesquite Rolling Upland. As reported by American Ag International, Inc. (1979), this SHS would likely decline in ecological condition to a creosote rolling upland or mesquite sand dune SHS, even with complete protection from grazing. The highest percentage of scaled quail observations were reported in this SHS. The expected decline would result in loss of a significant scaled quail habitat. It is assumed that the competitive advantage of the increasing brush species would be enhanced under the NA Alternative resulting in a faster decline than would occur without livestock grazing. The present rate of decline is unknown.

Half-Shrub Rolling Upland. Under the NA Alternative, the cyclic populations of broom snakeweed described in Chapter 2 would continue as at present. Mesquite or creosote would apparently have an enhanced opportunity to become established in sites where they do not occur now. Sites with creosote or mesquite would change to a creosote or rolling upland or mesquite sand dune SHS under the NA Alternative. Sites which became creosote rolling upland, based on the inventory records, would produce increased scaled quail populations. Most grassland associated species would decline.

Pinyon-Juniper Grass Mountain. According to the inventory data, this SHS is second in level of deer use. Under the NA Alternative, operator constructed livestock waters would likely result in new competition between deer and livestock.

Malpais. Most changes which would occur in this SHS would be determined by the adjacent SHS outside the malpais. Some pronghorn use was recorded in the malpais SHS, primarily where there is adjacent grassland. If the grassland would decline due to brush invasion, pronghorn use in the malpais would be reduced.

Creosote Rolling Upland. An estimated 71 percent of the creosote rolling upland SHS is currently in poor ecological condition and under the NA Alternative, ecological condition would not change significantly.

Creosote Breaks. An estimated 65 percent of this SHS is in poor ecological condition and has lost most production potential due to erosion (American Ag International, Inc. 1979). Under the NA Alternative, there would be a possibility that the 35 percent of the SHS in fair ecological condition would decline to poor condition because of continuing erosion.

Mesquite Sand Dune. This SHS would not change from the existing situation.

Big Game. Deer and pronghorn are projected to remain at the present less than optimum numbers under the NA Alternative, but big game numbers could decline as various SHS's change as described under the above discussions under this alternative. Big game populations would probably be slow to recover from levels lower than given for present populations, which occur occasionally because of nutritional factors discussed in Chapter 2, combined with higher levels of seasonal competition under the NA Alternative.

Raptors. There is no change expected for raptor prey base diversity under the NA Alternative. Warnock (1970), discussing Torrey yucca, reports that if rangeland continues to be mismanaged yuccas would finally appear only sporadically (50-75 years). The same would occur with soaptree yuccas and by 2010, yuccas would be less abundant than at present for raptor perch and nest sites under the NA Alternative.

Threatened or Endangered Species. For those threatened or endangered species which have been listed because of habitat attrition, no habitat improvement, leading to eventual delisting, would be possible under the NA Alternative. Potential for decline in habitat ecological conditions could result in the listing of additional species.

Summary. Under the NA Alternative, ecological conditions are expected to decline in three SHS's on a minimum of 243,312 acres (8.4 percent of the Planning Area) by 2010, and no significant improvement in ecological condition would be expected. Forage allocations for big game would remain in the present misapportioned condition, and achievement of optimum populations would be unlikely.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, the ecological condition of all habitats would trend toward climax communities (changes projected for most SHS's under the PA), although the time required to reach climax is unknown. Because of the unknown time factor and the lack of inventory data for excellent ecological condition sites, this alternative is evaluated by assuming the same level of improvement (10 points in ecological condition) used to evaluate the PA.

Riparian. This SHS would improve under the ELG Alternative. Changes are difficult to predict because of site variability and shortage of comparison data. However, the inventory data indicates an inital decline in summer bird diversity as poor condition sites are changed to fair, followed by an increase in summer bird diversity. Expected changes would also include an increase in tree reproduction and understory shrub components. The problem of livestock concentration in riparian sites would be eliminated.

Pseudoriparian. Production of desirable and intermediate shrubs would increase from about 5.8 pounds per acre to an estimated 12 pounds per acre with improvement by 10 points under the ecological condition class. It is likely that improvement would exceed the 10 points, but effects cannot be evaluated because there are no inventoried sites in better than fair condition for comparisons. Any sites with livestock waters would be expected to improve most.

Big Game. An estimate of the increase in forage available to big game under the ELG Alternative, considering 50 percent utilization, the percentage shrubs in each species diet, and making a rough allowance for each species, habitat preference indicates that forage would be available for approximately 16,000 deer and 3,600 pronghorn in the short-term and about 14,000 deer and 3,200 pronghorn in the long-term. The estimates shown on Table 3-14 are more reasonable when other limiting factors are considered. The ultimate effect on big game cannot be evaluated because of the lack of excellent condition sites for comparison.

Threatened or Endangered Species. The ELG Alternative would provide the best opportunities for accomplishing delisting of species which have declined because of habitat changes or habitat loss associated with livestock grazing. Examples may be Bell's vireo, Baird's sparrow, McCown's longspur, and possibly fish which have declined due to stream siltation related to overgrazing.

Summary. The ELG Alternative would provide the highest levels of big game populations attainable in the Planning Area. Ecological conditions in the valuable and sensitive riparian sites would be allowed to improve in ecological condition.

Maximization of Livestock Forage Production (MLFP) Alternative

The primary distinction between the MLFP Alternative and the PA is the amount of acreage proposed for chemical treatment. The chemical treatment areas primarily involve two SHS's, creosote rolling upland and mesquite sand dune.

Creosote Rolling Upland. Approximately 40 percent of this SHS is proposed for chemical or mechanical treatment. The effect of such treatments would cause a rapid change in the ecological condition of the SHS, but not a change to a different SHS. American Ag International, Inc. (1979) reported that mechanical treatment and reseeding could result in establishing new grass rolling upland sites. Improvement of ecological condition in this SHS results in improved plant species and structural diversity. Summer bird diversity would decline while small mammal diversity would increase. As shown on Table 3-14 the MLFP Alternative would improve habitat conditions for pronghorn. The treated portions of the SHS would also be improved for scaled quail.

Mesquite Sand Dune. Approximately 57 percent of this SHS would be chemically treated to remove mesquite. The SHS, based on team observations of treated areas on the Jornada Experimental Range, would not be changed from the mesquite sand dune aspect. However, there would be a leveling of the dunes and a decrease in the density of mesquite, and an increase in ground cover in the dune interspaces. Scaled quail use of this SHS would be expected to increase from the 1 percent of inventory observations toward the 21 percent of observations in the mesquite rolling upland SHS.

Big Game. Only under the MLFP Alternative are pronghorn expected to reach optimum numbers of 1,059 animals. The chemical and mechanically treated areas would be more suitable for pronghorn use after treatment because of reduction in brush, more than doubling suitable habitat in the Planning Area, from about 1,125 sections to about 2,331 sections.

Raptors. The extensive acreages of chemical treatments under the MLFP Alternative could result in a reduction of raptor populations by reducing available prey biomass (The highest levels of rodent biomass found in the inventory are estimated to occur in the mesquite sand dune SHS.) Some loss of perch and nest sites through plant mortality would occur, primarily through loss of yuccas by direct action of the chemical herbicides.

Enhancement of Other Resource Values (EORV) Alternative

The principal effect of this alternative on wildlife would be the rate of change in ecological conditions of habitats.

Riparian. The EORV Alternative would provide the best opportunity for management of riparian habitats. The fencing of the riparian SHS would prevent uncontrolled concentrations of livestock. Livestock grazing could be used to accomplish management objectives identified through wildlife activity planning. The ecological condition would improve in riparian sites, although the variability of sites and lack of comparison data limits ability to make predictions.

Threatened or Endangered Species. An assumed increase in trees and understory shrubs on some riparian sites would provide improved or expanded habitat for riparian associated threatened or endangered species, including the olivaceous cormorant, Mississippi kite, bald eagle, and Bell's vireo. The whooping crane prefers open wetland or shoreline situations (Drewien 1981). Some of the riparian areas along the Rio Grande Valley are overgrown with saltcedar. Although specific sites and grazing practices have not been identified, it is possible that a grazing season could be determined which would remove or control the saltcedars providing much improved habitat for whooping cranes. The fencing proposed for the EORV Alternative would provide for an opportunity to control grazing in the riparian SHS.

Livestock Grazing

Proposed Action (PA)

Under the PA, livestock grazing would continue to be disallowed on nine allotments. The total number of grazing allotments in the Planning Area would remain the same (198). Of these, 13 are presently managed under AMPs, involving 365,175 public land acres (See Table 3-15). In the short-term, net livestock AUMs would decrease from the 5-year average licensed use of 192,364 AUMs to 165,500 AUMs for a difference of 26,864 AUMs or about 14 percent. In the long-term, net AUMs would increase from the 5-year average licensed use of 192,364 AUMs to 215,070

AUMs, a difference of 22,706 AUMs or about a 12 percent increase (See Table 1-2, Figure 1-1, and Appendix E-2 for individual allotment AUMs).

Also, in the short-term under the PA, net livestock AUMs would be decreased from the grazing preference of 223,617 AUMs to 165,500 AUMs for a difference of 58,117 AUMs or about a 26 percent reduction. These AUMs would be held in suspended preference and most AUMs would be restored depending upon the improvement and capability of the forage base as determined by rangeland monitoring studies. In the long-term, net AUMs would be decreased by 8,547 AUMs from preference (223,617 AUMs) to 215,070 AUMs for about a 4 percent overall decrease.

Of the 185 non-AMP allotments, 70 allotments would be managed more intensively than at present (see Table 3-16). The total amount of public land involved is 1,486,772 acres. Grazing management treatments would be determined for each allotment, based on vegetative type and consideration of the physiological needs and requirements of the more important forage species as shown in Appendix B-10. Deferred rotation treatments offer sound grazing management if stocking rates are set at moderate levels, generally equivalent to moderate continuous grazing or about 40 percent utilization of the perennial grass herbage in an average year (Kothmann 1981; Martin 1975; Herbel 1974; Valentine 1970; and Johnson 1966).

Semidesert rangelands traditionally have been grazed yearlong, and research and experience show that these rangelands can be grazed at any time of year without serious detriment if the intensity of grazing is not too severe and periods of grazing alternate with suitable periods of rest. The primary shortcoming of continuous yearlong grazing is that it leads to excessive use in areas of concentration and wasted forage where cattle rarely graze. Also, the favorite plants and the favorite areas of a pasture are regrazed first each summer, thereby keeping them in a state of lower condition. Continuous yearlong grazing does not impose excessive grazing over an entire pasture during the summer growing season because only about one-fifth of the year's grazing takes place in a period that produces about 90 percent of the forage. That is, about 90 percent of the year's forage is produced in about 9 weeks, therefore yearlong grazing that consumes only 40 percent of the year's forage in 52 weeks removes only about 7 percent during the period of active summer growth (Martin 1975 and 1978).

The Arizona Interagency Range Committee 1973 (1974) also reports:

> "Except for the problem of distribution, yearlong grazing at appropriate stocking levels is a reasonably good system. Many alternatives that have been tried have not been superior to it, mainly because recovery during rest periods was offset by the impact of more rapid forage removal during the grazed

TABLE 3-15

EXISTING AMP ALLOTMENTS[a]

Allotment Numbers

3013
3015
3024
3026
3032
6018
6021
6024
6044
6072
6074
6089
6110

TABLE 3-16

ALLOTMENTS PROPOSED FOR INTENSIVE MANAGEMENT[a] UNDER PROPOSED ACTION

Allotment Numbers

2002
3001
3002
3003
3008
3009
3012
3016
3020
3022
3023
3027
3028
3029
3031
3033
3036
3038
3039
3040
3044
3046
3047
3052
5001
5002
5003
5004
5006
5007
5009
5013
6002
6004
6016
6017
6019
6020
6022
6023
6026
6027
6028
6032
6035
6041
6048
6049
6050
6053
6056
6059
6062
6067
6068
6075
6080
6081
6083
6084
6085
6091
6108
6113
6114
6132
6135
6141
6145
6146

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes: [a] See Appendix E-2 for allotment acreages.

> period. Also, systems such as resting during the summer in alternate years simply do not provide enough recovery time for grasses to regain vigor, seed, and establish new seedlings. Rotation systems that permit relatively heavy spring grazing following relatively heavy winter grazing are particularly harmful."

In any event, subsequent monitoring studies, such as forage utilization, condition and trend, actual use, and precipitation recordings would be implemented to assist the range manager and the permittee to evaluate the forage and its livestock supporting capabilities. Rangeland improvements would be constructed where necessary to improve livestock distribution. (See proposed rangeland improvements in Appendix E-4.) The permittees would be involved in all aspects of the grazing management and rangeland improvement needs and developments on their respective allotments (See Table 1-3). Chemical treatments would be applied to six allotments. Brush control would ameliorate rangeland condition and thus provide the opportunity for improved forage quantity and quality for livestock that otherwise would not be available. Mechanical treatment of cholla would be applied on one allotment.

During the recent workshop on impacts of grazing and specialized grazing systems held in El Paso, Texas (March 16-17, 1981), it was pointed out that if one explores the literature, it is fairly easy to compile a convincing argument in favor of some kind of rotational grazing management based on plant physiology and greenhouse studies, but when the field experiments are canvassed, the verification is ambiguous (Norton 1981). Consequently, rangeland literature reviews and studies show no clear concensus that livestock are more productive under grazing systems than when allowed to graze yearlong (Pieper et al. 1978; Beck 1978; Dwyer 1980; Heady 1980; Martin 1975; and Kothmann 1980). In fact, specialized grazing systems as conventionally used, rarely increase and frequently decrease individual animal production (Malechek 1981). Several studies have not shown any significant changes in the plant community resulting from continuous grazing (Pratchett and Shrive 1968; Beck 1978; Kothmann et al. 1978; Pieper et al. 1978; McIlvain and Savage 1951). Beck (1980) concluded in his review of the literature on southwestern grazing that the impacts of grazing systems on the plant community are not well understood, and that until vegetation changes are documented over a long period of time, the validity of grazing systems in the southwest will remain questionable. Grazing management designed where high utilization of the plant is a requisite for livestock performance (Savory System, and other high intensity-short duration method) is not advisable on arid or semiarid rangelands of the southwest (Beck 1980).

Because of the conflicting literature and study results and the little evidence to support livestock improvement under specialized grazing management, Herbel and Nelson (1969) and Herbel (1974) highly regard their concept of "Best Pasture" for sound grazing management on semiarid shrublands. An objective is set for each pasture and stocked accordingly. The "Best Pasture" is opportunistic in that the attempt is made to maximize the use of forbs and short-lived grasses. No set stocking plan by calender dates is set because of the variable weather pattern and conditions that affect plant growth. Under the treatment, when cattle are moved, they are put on the pasture with the best forage at that time so as to benefit both plants and animals.

Valentine (1967) developed a grazing management treatment for semiarid rangeland on the New Mexico State University Experimental Ranch (near Las Cruces) called "Seasonal Suitability." It is very similar to the "Best Pasture" approach, livestock are moved into those pastures whenever green forage becomes available due to local rains, and then are returned to their original pastures to complete the grazing season. It allows perennial forage plants to rest at least part of the growing season and is flexible so livestock can make use of ephemeral forage anytime it is available. However, 10 years of data have not shown it to be superior to yearlong grazing with which it was compared, although it is fundamentally sound in principle (Beck 1978).

These management schemes promote flexibility because of the variable precipitation patterns common to southwestern rangelands. Also, cattle on semidesert rangeland utilize a wide variety of plants, most of which contribute more to cattle diets then generally believed (Rosiere et al. 1975). About 30 to 35 percent of the diets of cattle on semidesert rangelands are comprised of forbs on a yearly basis (Pieper and Beck 1980). Rosiere et al. (1975) found that over one-half of the diets in certain seasons were comprised of forbs and shrubs, and that perennial grasses never comprised more than 50 percent of a steer's diet in any season.

The other 115 allotments would receive less intensive management (See Table 3-17). The total amount of public land involved is 265,655 acres. Grazing management treatments would not be applied, as yearlong grazing would continue. Some degree of monitoring forage utilization on these allotments would likely be accomplished to ensure proper use of the forage.

Summary. Under the PA, net livestock AUMs would decrease by 14 percent in the short-term from the 5-year average licensed use (current grazing level) and would increase by about 12 percent in the long-term. From grazing preference in the short-term, there would be an overall decrease of 26 percent and a total loss of 4 percent in the long-term, as the original grazing preference AUMs would not be fully regained. During the interim period from short-term to long-term or until monitoring studies showed otherwise, 58,117 AUMs would be held in suspended preference. Restoration of these AUMs would be totally contingent upon rangeland production and the grazing monitoring studies.

Of the total 198 allotments in the Planning Area, 13 are currently under AMPs (365,175 public land acres). An additional 70 allotments

TABLE 3-17

ALLOTMENTS MANAGED LESS INTENSIVELYa/

Allotment Numbers

2001
2031b/
2051
3004
3006
3007
3010
3011
3014
3018
3019b/
3025b/
3034
3035
3037
3041b/
3042
3043
3045b/
3048b/
5008b/
5010b/
5012
6001
6003
6005
6006
6007
6008

6009
6010
6011
6012
6013
6014
6015
6025
6029
6030
6031
6033
6034
6037
6038
6039
6040
6042b/
6043
6045
6046
6047
6054b/
6055b/
6057b/
6058
6060
6061
6063

6064
6065b/
6066
6069
6070b/
6071
6073
6076
6077
6078
6079b/
6082b/
6086b/
6087
6088
6090
6093
6094
6095
6096
6097
6098
6099
6100
6101
6102b/
6103b/
6104
6105

6106
6109
6111
6112
6115
6116
6117
6119
6120
6121
6122
6123
6124
6125
6126
6127
6128
6129
6130
6131
6133
6134
6136
6137
6138
6140
6142
6144b/

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes: a/See Appendix E-2 for allotment acreages.

b/Indicates allotments selected for intensive management under MLFP Alternative in addition to PA.

(1,486,772 public land acres) would be administered under some form of intensive grazing management and monitored. The other 115 allotments (265,655 public land acres) would be managed less intensively and would continue under continuous yearlong grazing.

No Action (NA) Alternative

Under the NA Alternative, livestock grazing management and livestock production practices would not be changed from the existing situation. The existing 13 AMP allotments would remain under intensive management, and the other 185 allotments would continue to be graze as at present. The grazing preference of 223,617 AUMs would remain unchanged through the long-term. The 5-year average licensed use of 192,364 AUMs, which most nearly approximates actual use of the rangeland, would continue at or near that level. No new grazing schedules or treatments would be developed or implemented. Also, no new rangeland improvements or vegetative treatments would be implemented, except that 8100 funds would continue to be used as at present (i.e., first priority for these funds would be given to AMP allotments). Therefore, livestock production would remain as stable as presently exists or as the beef market allows.

It is thought that present grazing levels may be excessive to proper use of the rangeland, and that if allowed to continue, more intensive deterioration might occur. Only time and rangeland monitoring studies would tell. York and Dick-Peddie (1969) reported for southern New Mexico that vegetational patterns have changed and that so many sites have been modified during the past hundred years that what once may have been considered as a desert grassland climax can be considered now as a desert climax, which has culminated in a desert-shrub vegetation complex. And according to Norton (1981), relaxing grazing pressure on semiarid grass-shrub rangeland vegetation to allow successional processes to generate a natural improvement in rangeland condition is not a valid concept. He further states:

> "Once the competitive balance has shifted in favor of the woody species, and shrub seedlings become established in greater numbers than before, then the continued grazing pressure on the grass combined with natural growth of the established shrub population will squeeze out the perennial grass component. It is necessary to wait until the new generation of shrub plants has reached an age of natural mortality before other perennial plants have an opportunity to replace them. . .
>
> While grazing by domestic livestock can accelerate the change toward dominance by shrubs, it is unwise to assume that reduced grazing pressure can reverse the change once it has been initiated. It may happen, but not often enough to be a reasonable expectation."

He further remarks that to allow a substantial increase in population density of an unpalatable shrub that can live for hundreds of years would virtually set the ecological future of that site for centuries unless intervention by fire, herbicide, or mechanical treatment prevails. In effect, it may be a thousand years before creosote that has taken over the desert grasslands is eventually replaced via a successional pathway.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, all livestock would be removed from the public land within the Planning Area (See Figure 1-3). AMP's would be cancelled. No grazing permits or licenses would be issued. No new rangeland improvements would be constructed, and existing structures on public land would either be removed, abandoned, or maintained for wildlife. Many ranchers would be forced to liquidate or disperse their herds or obtain other grazing land to remain in business, as several permittees depend heavily upon public land grazing privileges. All AUMs would be available for wildlife and watershed value.

Maximization of Livestock Forage Production (MLFP) Alternative

Generally, the short-term impacts on allotments would approximate those under the PA. Livestock AUMs would be decreased 14 percent from the 5-year average licensed use and 26 percent from grazing preference. In the latter case, the AUMs would be held in suspended preference until monitoring studies indicated an increased forage base. However, in the long-term, the anticipated forage increase would provide for 81,992 AUMs over the existing preference (223,617 AUMs to 305,609 AUMs). Thus the opportunity would allow for a substantial rebuilding of herd numbers from the short-term, and would certainly provide for a significant amount of beef production over and above the existing situation.

Under this alternative, an additional 20 allotments (involving 90,758 acres of public land) would be selected for intensive management (See Table 3-17).

Enhancement of Other Resource Values (EORV) Alternative

The short-term impacts of the EORV Alternative would be far greater and considerably more severe than under the PA. Net livestock AUMs would be reduced 54 percent (223,617 AUMs to 102,610 AUMs) or 121,007 AUMs in the short-term from the grazing preference (See Figure 1-5). Suppression of beef production of this magnitude would cause severe hardship and stress on some livestock operations which would likely result in a significantly low rate of survival. In the long-term, it is expected that rangeland forage would increase to where 214,360 AUMs could be grazed. This would amount to 9,257 AUMs less than the grazing preference or about an overall 4 percent less, as original grazing preference would not be totally regained.

Net livestock AUMs would also decrease from the 5-year average licensed use of 192,364 AUMs to 102,610 AUMs for a decrease of 89,754 AUMs or 46 percent in the short-term. In the long-term, net livestock AUMs would increase from 192,364 AUMs to 214,360 AUMs for an increase of 21,996 AUMs or 11 percent.

Water Resources

The PA and alternatives would have direct and indirect impacts to the water resources throughout the Planning Area. Direct impacts such as water consumption rates are relatively easy to determine and quantify. Indirect impacts are much more difficult to assess and quantify for large areas because of the many variables involved (e.g., differences in topography, climate, soils, vegetative types, ground cover percents, stocking rates, etc.).

When assessing the impacts of the PA and alternatives on the surface water (primarily runoff rates), several assumptions and averages were made:

1. one square mile for watersheds,
2. a 24 hour storm event occurring an average of once every 10 years,
3. an average of 10 percent slopes on hills,
4. 2 percent slope on gravelly and gravelly loam sites,
5. level slopes on sandy and shallow sandy areas,
6. average vegetative types and ground cover for the range sites, and
7. predicted changes in vegetative ground cover taken from Appendix B-6.

Proposed Action (PA)

Under the PA, surface runoff volumes would decrease 6 percent in the long-term on grass watersheds of the hills, gravelly, gravelly loam, malpais, draw, and loamy range sites where vegetative cover increases more than 5 percent.

On watersheds dominated by desert shrub vegetation (e.g., gravelly range site with creosote) runoff volumes would not change because of the small change in ground cover (average of 7 percent) on these sites as calculated by the method used (SCS 1972). Runoff would not change on areas of the sandy, shallow sandy, deep sand, bottomland, clayey, or salt flats range sites because of level slopes or sandy soils with rapid infiltration rates.

In areas where runoff is reduced, surface water quality is expected to slightly improve because of the lower amounts of suspended sediment and dissolved solids transported by the runoff water. The improvement of the water quality cannot be quantified.

Where rangeland improvements are constructed, local disturbances on 734 acres would cause an increase in runoff until vegetation becomes reestablished on the areas. These local areas of disturbances would not cause a significant change in total runoff from any particular watershed. Construction of the 14 additional dirt tanks would decrease that amount of water from reaching the surface water basins. The 40 additional wells would remove water from ground water aquifers, but the amount would not be a significant loss from any of the ground water resources. Exposed surface water at the new wells and tanks would increase the amount of water "lost" through evaporation, but the loss would be insignificant.

Chemical treatments on 9,705 acres of creosote on the gravelly range site would increase surface runoff an average of about 8 percent on the sprayed areas for 2 to 3 years following the treatments until vegetation becomes reestablished. In the long-term, however, runoff volumes would be the same as unsprayed areas because no significant changes in total ground cover are expected.

Chemical treatments on 29,772 acres of mesquite on the sandy and deep sand range sites would not significantly affect surface runoff because of nearly level slopes and very rapid infiltration rates of the sandy textured soils.

Mechanical treatments on 600 acres of cholla on the loamy range site of the Western Plateau MLRA would not significantly affect runoff rates because of nearly level slopes of the area.

Under the PA, consumptive water use by livestock and big game would be 184 acre-feet per year in the short-term and 240 acre-feet per year in the long-term which would be approximately 11 percent more water than is presently consumed.

Summary. Under the PA, runoff would be decreased 0 to 6 percent, depending on soil types, vegetative types, ground cover, slopes, etc., within the watershed. No significant changes in runoff rates would be expected as a result of construction of rangeland improvements or vegetation treatment areas. Water consumption by livestock and big game would increase 11 percent by the year 2010.

No Action (NA) Alternative

Under the NA Alternative, no adjustments in livestock numbers or rangeland improvements are proposed. No significant changes in surface or ground water resources would occur under this alternative. Livestock and big game would continue to consume 214 acre-feet per year.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, surface runoff volumes would be decreased 17 percent on grass, mountain shrubs, and juniper-grass watersheds of the hills, gravelly, gravelly loam, breaks, malpais, loamy, and draw sites where vegetative cover increases more than 6 percent. Runoff volumes would not decrease on watersheds with desert shrub vegetation because ground cover changes would not be large enough to affect runoff calculated by the method used (SCS 1972). Runoff volumes also would not be affected on the sandy, deep sand, shallow sandy, bottomland, salt flats, or clayey sites because of nearly level slopes or rapid infiltration rates of the sandy soils in these sites.

In areas where runoff is reduced, a decrease in suspended sediment and dissolved solids transported by runoff water would improve quality of surface waters. The improvement, however, cannot be quantified. Ground waters would not be affected by this alternative.

The ELG Alternative would eliminate the consumption of 213 acre-feet per year by livestock. Big game would consume four acre-feet of water in the long-term.

Maximization of Livestock Forage Production (MLFP) Alternative

Under the MLFP Alternative, the construction of additional rangeland improvements would result in the short-term local disturbance of 1,067 acres and increase of 333 acres over the PA. As in the PA, these local areas of disturbance would not cause a significant change in total runoff from any particular watershed. Dikes proposed to control gullying by water erosion would decrease the amount of water reaching the surface water basins, but the amount would be difficult to predict.

In addition, the MLFP Alternative proposes chemical treatments on 381,203 acres of creosote and 391,218 acres of mesquite, and mechanical treatments of 12,318 acres of creosote, 11,765 acres of tarbush, and 600 acres of cholla.

Chemical treatments on 381,203 acres of creosote on the gravelly and gravelly loam range sites would increase surface runoff an average of about 10 percent in the short-term because of the reduction in ground cover following treatments. After vegetation becomes reestablished on the sprayed areas, the decrease in runoff would not be significantly different than unsprayed areas because of the small increase in total ground cover (4 to 9 percent depending on location and condition).

On the 319,218 acres of chemical treatments on mesquite on the sandy and deep sand range sites, runoff rates would not be significantly affected because of the nearly level slopes and rapid infiltration rates of the sandy textured soils.

Where mechanical treatments are applied to 12,318 acres of creosote, 11,765 acres of tarbush, and 600 acres of cholla on the loamy and gravelly loam range sites runoff rates would increase about 14 percent for 2 to 3 years following treatments because of the decrease in ground cover. In the long-term, total average increase in ground cover is expected to be about 7 percent, therefore, no significant increase in runoff is expected when compared to adjacent untreated areas. Studies in Arizona have shown similar results on areas where creosote, tarbush, and whitethorn were rootplowed (Trumble 1976). The studies showed that when crown cover decreased, runoff increased. By the same token, when cover increased, runoff rates decreased.

Water consumption by livestock and big game would be 184 acre-feet per year in the short-term and 340 acre-feet per year by the year 2010; an increase of about 37 percent in the long-term.

Summary. No significant increases in runoff would be expected in the long-term as a result of the rangeland improvements or vegetation treatments under the MLFP Alternative. Water consumption by livestock and big game would increase about 37 percent by the year 2010.

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, the reduction in stocking rates would decrease surface runoff volumes about 10 percent in the long-term on grass watersheds of the hills, gravelly, gravelly loam, breaks, malpais, draw, and loamy range sites where vegetative cover increases more than 5 percent. On watersheds dominated by desert shrub vegetation, runoff volumes would not change because of the small change in ground cover on these sites expected under the EORV Alternative. Runoff would not change on areas of the sandy, shallow sandy, deep sand, bottomland, clayey, or salt flats range sites because of nearly level slopes or sandy textured soils with rapid infiltration rates.

In areas where runoff is reduced, surface water quality within the watershed would slightly improve because of the reduced suspended sediment and dissolved solids carried by the runoff water. The improvement in quality cannot be quantified.

Elimination of grazing on 14,629 acres of watershed on medium to fine textured soils of the draw and loamy range sites which are in the critical and severe erosion class would prevent further deterioration of these sites. Runoff from these sites would decrease an average of 10 percent in the long-term. No change in runoff is expected on the 14,456 acres of riparian habitat in the bottomland sites in poor and fair ecological condition because of nearly level slopes in these areas.

Where rangeland improvements and fencing of the critical watersheds and riparian habitats take place, 827 acres would be disturbed causing a short-term increase in runoff, but the amount would not cause a significant change from any particular watershed.

Chemical treatments on 9,705 acres of creosote on the gravelly range site would increase surface runoff an average of about 8 percent on the sprayed areas in the short-term. However, runoff volumes would be the same as unsprayed areas in the long-term because no significant changes in total ground cover are expected.

Chemical treatments on 29,772 acres of mesquite on the sandy and deep sand range site would not significantly affect surface runoff because of nearly level slopes and rapid infiltration rates of the sandy textured soils.

Mechanical treatment on 600 acres of cholla on the loamy range site of the Western Plateau MLRA would not significantly affect runoff rates in the long-term.

Water consumption by livestock and big game would be 114 acre-feet per year in the short-term and 239 acre-feet per year in the long-term. The long-term consumption rates are 10 percent more than is presently consumed.

Summary. Under the EORV Alternative, surface runoff would decrease about 10 percent on some areas in the long-term. Runoff rates would not change significantly from some areas. Runoff would decrease about 10 percent on protected watersheds in critical and severe condition but no change in runoff would be expected from the protected riparian areas. Water consumption by livestock and wildlife would increase about 10 percent by the year 2010.

Air Quality

Proposed Action (PA)

Under the PA, the mechanical treatment of vegetation on 600 acres and the construction of various rangeland improvements would result in localized generation of dust during operations. The additions of these particulates to the air would be of short duration (on the order of hours) and have minimal impacts on the air quality of the Planning Area. Until revegetation occurs on these disturbed areas, there would be localized, short-term impacts resulting from dust being blown into the air during periods of high-velocity winds, especially during the spring months.

The chemical treatment of vegetation on 39,477 acres would utilize herbicides approved by the Environmental Protection Agency (EPA) and the Department of the Interior (DOI). The use of herbicides in granular form (pellets) would not be expected to affect air quality. The use of liquid sprays, however, would have minimal, localized effects on air quality.

Liquid herbicides are generally available in three kinds of formulations: esters, low-volatile esters, and amine salt formulations. Esters have the greatest tendency to volatilize and drift when used in spray applications. However, under the PA, only low-volatile esters or amine salt formulations would be used.

The hazard of herbicides drifting during aerial spray operations would be dependent upon weather conditions, the distance that droplets must fall, and the size of the droplets. Volatility rates would be dependent mostly upon droplet size and air temperature. Generally, spray droplets less than 200 microns tend to volatilize faster than larger droplets.

The Vegetation Treatment Guidelines (described in Appendix E-6) would significantly reduce volatilization and drift when aerial spray applications occur under the following conditions: air temperature is less than 85°F, wind velocity is less than 7 miles per hour, precipitation is not imminent, application is at 20 feet or less above the ground, and droplet size is greater than 200 microns.

The amount of herbicide drift and volatilization which would be considered as having significant effects on the atmosphere would be difficult to estimate. However, the proposed herbicide applications for control of vegetation would be expected to have only localized, short-term impacts on the air quality in relatively isolated regions of the Planning Area.

In summary, under the PA effects on the air quality of the Planning Area resulting from various rangeland improvements and mechanical and chemical treatment of vegetation would be expected to be minimal, being localized and of short duration.

No Action (NA) Alternative

Impacts upon air quality under the NA Alternative would be essentially the same as those that exist now. Pollutants would include carbon monoxide from automobiles, sulfur dioxide from smelters and other industries burning fossil fuels, and blowing dust, especially during the windy spring months.

Elimination of Livestock Grazing (ELG) Alternative

Impacts upon air quality resulting from the ELG Alternative would remain essentially the same as those that exist now. Pollutants would include carbon monoxide from automobiles, sulfur dioxide from smelters, and other industries burning fossil fuels, and blowing dust,

Maximization of Livestock Forage Production (MLFP) Alternative

The impacts upon air quality resulting from proposed rangeland improvements under the MLFP Alternative would consist essentially of localized generation of dust during operations.

Under the MLFP Alternative, the number of acres proposed for vegetation treatment (797,104 acres) would be greater, resulting in higher concentrations of dust and herbicides being added to the air. The impacts, however, would remain localized and of short duration and would not significantly affect the air quality of the Planning Area.

Enhancement of Other Resource Values (EORV) Alternative

Impacts upon air quality resulting from the EORV Alternative would consist of localized generation of dust from mechanical treatment of vegetation and other rangeland improvements, and localized, short-term effects resulting from herbicide drift and volatilization during chemical treatment of vegetation.

Cultural Resources

Proposed Action (PA)

Under the PA, cultural site location can only be predicted on 660 sections northeast of Radium Springs that has been covered by a 5 percent Class II survey. This makes the predicting of impacts on an allotment-by-allotment basis virtually impossible in most of the Planning Area. Based on the existing survey data, there is an average of one site per 172 acres. The reduction of 26,864 AUMs from the present rate of stocking would result in a temporary reduction in the rate of livestock trampling away from areas of livestock concentration; however, the long-term effect of increasing the AUMs by 22,706 over the present rate of stocking would lead to an increase in the rate of trampling.

Based on the number of acres heavily trampled around livestock waters and the number of acres disturbed by a construction project, Table 3-18 gives a prediction of cultural sites disturbed by the PA (using the above acres per recorded site). Sixty-four sites are predicted to be in the area of construction projects. Before construction starts, a Class III survey would be performed on the area of primary and secondary impact to determine if a site is present. If a site is located during a preconstruction survey, every effort would be made to relocate the rangeland improvement away from the site. If it cannot be relocated, then Section 106 compliance procedures would be initiated to start the formal mitigation process. The cattleguards were not considered because they would be placed on existing roads where any sites are already disturbed. The spring was not considered in the table because it can be assumed that a site would be present around a permanent water source.

TABLE 3-18

PREDICTED CULTURAL SITES IMPACTED BY THE PROPOSED ACTION AND ALTERNATIVES[a]

Rangeland Improvement	Proposed Action				No Action				Elimination of Livestock Grazing[f]			
	Acres Surveyed[b]				Acres Surveyed				Acres Surveyed			
	Units	Per Unit	Total	No. of Sites[c] Predicted	Units	Per Unit	Total	No. of Sites Predicted	Units	Per Unit	Total	No. of Sites Predicted
Dirt Tanks	14	40	560	3	N/A[e]				N/A			
Pipeline (miles)	173	6	1,038	6	7	6	42	1	N/A			
Troughs	177	40	7,080	41	6	40	240	1	N/A			
Wells	40	1[d]	40	1	N/A				N/A			
Storage Tank	34	1[d]	34	1	N/A				N/A			
Fence	256	6	1,536	9	N/A				N/A			
Mech. Veg. Trtmt. (acres)	600		600	3	N/A				N/A			
Total			10,888	64			282	2				

Rangeland Improvement	Maximization of Livestock Forage Production				Enhancement of Other Resource Values			
	Acres Surveyed				Acres Surveyed			
	Units	Per Unit	Total	No. of Sites Predicted	Units	Per Unit	Total	No. of Sites Predicted
Dirt Tanks	14	40	560	3	14	40	560	3
Pipeline	250	6	1,500	9	173	6	1,038	6
Troughs	302	40	12,080	70	177	40	7,080	41
Wells	116	1	116	1	40	1	40	1
Storage Tank	123	1	123	1	34	1	34	1
Fence	277	6	1,662	10	348	6	2,088	12
Mech. Veg. Treatment	24,683		24,683	143	600		600	3
Total			40,724	237			10,888	67

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes: a/This table does not include trampling away from water sources, such trampling affects sites over long periods of time to an unknown degree.

b/The acres surveyed for dirt tanks and troughs represents areas of predicted intensive trampling as well as actual construction. The acres surveyed for fences and pipelines represent the regular BLM transect width of 50 feet rather than the area of actual disturbance which would be less than 50 feet.

c/In cases where site prediction is less than one, one site is predicted.

d/Almost all wells and storage tanks would have a watering facility associated with them in which case 40 acres would be surveyed. In the few cases where there are no watering facilities only the actual disturbed area would be surveyed.

e/N/A - the improvement is not proposed under this action.

f/The Elimination of Livestock Grazing Alternative would have several impacts that are not quantifiable at this time. They are: 1. Sites damaged by the fencing of private and state lands which would not be surveyed. 2. Damage caused by the removal of rangeland improvements. 3. The elimination of some old rangeland improvements which could be classified as historic sites.

The Class III inventories for rangeland projects would add new data on 10,888 acres disturbed during rangeland improvements assuming a Class III survey of all surface disturbing projects. The fencing of the Burton Bead site and other significant sites as they are located would result in the elimination of trampling on those sites. No unvandalized sites would be fenced because the fencing could attract vandals. The increased protection of the cultural resource would allow for increased public interpretation. The increased numbers of people in the Planning Area for hunting would cause a minor increase in artifact hunting.

The rangeland improvements and vegetative treatments would have various impacts on cultural resources, as shown in Table 3-19. The chemical treatment impacts were arrived at by contacting various radiocarbon laboratories for their opinions (letters of reply are available

TABLE 3-19

SUMMARY OF IMPACTS OF THE PROPOSED ACTION

Impact	Agent of Impact	Effect	Degree of Impact[a/]
Trampling away from water	Livestock and Wildlife	Churning of sites, especially during wet periods, leading to artifact breakage and movement.	Low to Moderate
Watering Facilities	Livestock and Construction	Destruction of site through construction and severe churning leading to major artifact breakage, movement, and elimination of site integrity.	High
Pipeline	Construction	Destruction of any portion of a site the pipeline goes through by breakage and loss of stratographic control.	Low
Fence	Construction and Trampling	Very minor damage through construction, trampling leading to artifact breakage and movement near the fence.	Low
		A visual and physical impact to historic trails.	Moderate
Mechanical Vegetation Treatment	Soil Disturbance	Breakage of artifacts and loss of vertical and horizontal control. Increased erosion until new vegetation is established.	High
Chemical Vegetation Treatment	Erosion	Erosion would expose sites before new vegetation is established. Once the dunes fill in the blowouts and new vegetation is established most sites will be difficult to locate. Historic trails would lose some of their integrity.	Low

Source: BLM Las Cruces District EIS Team Files, 1980.

Notes : a/ Low - The impact would not significantly alter the research, scientific, or recreational values of the resource.
Moderate - The impact would alter or destroy a significant portion of the research, scientific, or recreational values of the resource.
High - The impact would alter or destroy almost all of the research, scientific, or recreational values of the resource.

for review in the Las Cruces District Office). Most laboratories thought that they could remove the inert carbon if they knew the sample was contaminated; the removal of any modern carbon would be more difficult. This would mainly affect shallow hearths and soil samples.

In summary, the PA would result in decreased trampling in the short-term with increased trampling in the long-term. The surface disturbing projects would affect 10,888 acres and a projected 64 sites. All of these areas would be surveyed with every effort made to relocate the project if a site would be affected. If no resolution is possible, the 106 consultation process would be started.

No Action (NA) Alternative

Under the NA Alternative, trampling damage would be maintained at its present rate. The construction of the rangeland improvements would entail 282 acres of disturbance through trampling and construction with a projected impact on two sites (See Table 3-18). The lack of additional monitoring studies on most allotments would have a slight effect because information beneficial to cultural resource management would not be gathered. The lack of new AMPs would make the management of cultural resources on most allotments more difficult because of the lack of long-term planning.

Elimination of Livestock Grazing (ELG) Alternative

The ELG Alternative would reduce livestock trampling on public land in the Planning Area by 100 percent; however, wildlife trampling would remain a factor around some water sources. The elimination of grazing would destroy part of the ongoing historical development and lifestyle of the area (i.e., a long established industry would be suddenly abolished). The removal of livestock improvements would cause some new soil disturbance and the loss of some potential historical structures.

Maximization of Livestock Forage Production (MLFP) Alternative

In the long-term under the MLFP Alternative, there would be a 37 percent increase over the existing environment in the trampling of cultural resources. The proposed rangeland improvements would disturb 40,724 acres which is projected to affect 237 sites (See Table 3-18). The spraying would affect 9 miles of the Butterfield Trail and 12-1/2 miles of the Jornada del Muerto Trail by changing the vegetation differences which mark the trails' route. The cultural survey of the mechanical treatment area would result in 24,683 acres surveyed with an anticipated 173 sites located. Mechanical treatment would damage sites by churning and artifact breakage, while chemical treatment would result in increased erosion until new vegetation is established.

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, the elimination of livestock grazing on 29,085 acres of riparian habitat and certain watershed areas and the reduction of livestock grazing by 50 percent on rangeland in poor condition and 25 percent on fair condition would reduce livestock trampling in the short-term by 40 percent. However, in the long-term, trampling would increase approximately 10 percent over the existing situation. In the short-term, this would slow the rate of artifact breakage and displacement, however, the rate of damage would increase in the long-term. The fencing of the Burton Bead site, and other significant sites as they are located, would result in a high impact on the site because of the elimination of grazing. No unvandalized sites would be fenced because the fencing could attract vandals. The increased protection of the cultural resource would allow for increased public interpretation. The increased numbers of people in the Planning Area for hunting would cause a minor impact through increased artifact hunting. The protection of watersheds that are severely eroding would slow the rate of destruction of any site in the watershed that is threatened by erosion. The impact of the rangeland improvements is shown in Table 3-18.

Summary. A summary of the impacts to cultural resources by the various alternatives is contained in Table 3-20.

Visual Resources

Proposed Action (PA)

Under the PA, structures and treatments would cause visual contrasts in the landscape. The amount of contrast cannot be assessed at this time because the specific location and design of proposed rangeland improvements and vegetation treatments are not known. The exact amount of visual impact of each treatment would be determined from a site-specific Environmental Assessment (EA) prior to implementation of new grazing management treatments. Visual contrasts are expected to be minimized to a degree that is compatible with the VRM class of the area in which the contrasts would occur. No change in VRM classes would be expected.

No Action (NA) Alternative

Under the NA Alternative, no new rangeland improvements or vegetative treatments are anticipated. This alternative would not impact visual resources. No change in VRM class would occur.

Elimination of Livestock Grazing (ELG) Alternative

Impacts to visual resources would occur as a result of the ELG Alternative. No new grazing related improvements would be constructed and no vegetative treatments would occur. Existing unnecessary rangeland

TABLE 3-20

SUMMARY OF THE IMPACTS OF THE VARIOUS ALTERNATIVES ON CULTURAL RESOURCES

Impact	Proposed Action	No Action	Elimination of Livestock Grazing	Maximization of Livestock Forage Production	Enhancement of Other Resource Values
Trampling Away From Water	Moderate -	Moderate -	High +	High -	Moderate -
Watering Facilities	High -	Low -	High +	High -	High -
Pipeline	Low -	Low -	NA	Low -	Low -
Fencing	Low -	NA	NA	Low -	Low -
Mech. Veg. Treatment	High -	NA	NA	High -	High -
Class III Surveys	High +	Moderate +	Moderate -	High +	High +
Fencing on Historic Trail	Moderate -	NA	NA	Moderate -	Moderate -
Trailing	NA	NA	Low -	NA	NA
Removal of Potential Historical Structures	NA	NA	Low -	NA	NA
Increased Visitation	NA	NA	NA	NA	NA
Fencing of Cultural Sites	NA	NA		NA	NA

Source: BLM Las Cruces District Office EIS Team Files, 1980.

Notes: NA - Impact will not occur.

The narratives for each of the alternatives explain and elaborate on the impacts. Each impact has been assigned a relative rating indicating the expected degree of impact.

Low -	- The impact would slightly alter the research, scientific, or recreational values of the resource.
Moderate +	- The impact would provide information regarding the potential impacts on cultural resources or would not alter or destroy any portion of the resource.
Moderate -	- The impact would alter or destroy a significant portion of the research, scientific, or recreational values of the resource.
High +	- The impact would add to the knowledge of cultural resources or would not alter or destroy any portion of the resource.
High -	- The impact would alter or destroy almost all of the research, scientific, or recreational values of the resource.

The impacts can be immediate and severe as in the case of construction on a site or slow and subtle as in the case of cattle trampling away from water sources.

improvements would be removed. Contrasts which result from existing rangeland improvements would be reduced. No change in VRM class would occur.

Maximization of Livestock Forage Production (MLFP) Alternative

Under the MLFP Alternative, structures and treatments would cause visual contrasts in the landscape. The amount of contrast caused by the structures cannot be assessed at this time because the specific location and design of the structures are not known. Visual contrasts caused by structures and treatments would be determined from a site-specific EA prior to implementation of the alternative. No change in VRM class would occur.

Enhancement of Other Resource Values (EORV) Alternative

Under the EORV Alternative, structures and treatments would cause visual contrasts in the landscape. Visual contrasts are expected to be minimized to a degree that is compatible with the VRM class of the area in which the contrasts would occur. No change in VRM classes would occur.

Wilderness

Proposed Action (PA)

The exact locations and design of proposed rangeland improvements are not now known. Because of this the exact impacts of the PA cannot be quantified. Application of the standard operating procedures for WSAs as outlined in Chapter 1 would prevent degradation of wilderness values.

All activities, including grazing would be managed in accordance with the Interim Management Policy (1979) until Congress makes a final wilderness decision. Livestock grazing would continue in the same manner and degree as that authorized during the 1976 grazing fee year. New developments would be allowed if they are substantially unnoticeable in the area. Motorized access on existing ways and trails would continue during the wilderness study.

No Action (NA) Alternative

The NA Alternative would not impact the wilderness values of the SRGPA. All activities, including grazing would be managed in accordance with the Interim Management Policy until Congress makes a final wilderness decision.

Elimination of Livestock Grazing (ELG) Alternative

Under the ELG Alternative, the vigor of the plant communities within WSAs would improve. This would improve the natural and scenic qualities of the WSAs.

Removal of any existing rangeland improvements located within WSAs would reduce the amount of vehicle use on the existing access routes to such improvements. Removal of improvements and reduced use on access routes could improve the scenic and natural qualities of the WSAs.

Maximization of Livestock Forage Production (MLFP) Alternative

Under the MLFP Alternative, all activities, including grazing, would be managed in accordance with the Interim Management Policy until Congress makes a final wilderness decision.

Improved water distribution could increase livestock utilization of forage within the WSAs.

Enhancement of Other Resource Values (EORV) Alternative

All activities, including grazing, would be managed in accordance with the Interim Management Policy until Congress makes a final wilderness decision. This management would prevent degradation of wilderness values.

Recreation

Proposed Action (PA)

Under the PA, recreation use of the Planning Area would be impacted in various ways. Fences constructed without adequate access would hinder recreation and off-road visitor use of public land. Livestock watering devices constructed near existing or potential intensive use recreation areas would concentrate livestock use in these areas and thereby increase the interaction and conflict between recreationists and livestock. Site-specific Environmental Assessments (EAs) would be written prior to any construction projects and mitigating measures such as fencing and providing access would be required.

Non-hunting associated recreation visitor days would be expected to increase under the PA and all alternatives due to a predicted increase in the human population of the area.

Deer hunting pressure would increase with any alternative due to increases in the regional population. This change would occur regardless of management actions. For the purpose of this analysis the changes in deer hunting visitor days would be a proportional change based on the deer population. These projections are useful in identifying future trends in visitor use. Appendix I explains the method used to project future hunting visitor days.

Pronghorn hunting pressure would continue to be regulated by the New Mexico Department of Game and Fish. Future trends in pronghorn hunting visitor days would be based on the pronghorn population. The number of permits issued for pronghorn would be determined by the system which is currently being used.

Deer hunting visitor days would increase under the PA to approximately 6,243. This is an increase of 3,456 visitor days from the existing level of use. There would be no significant change in pronghorn hunting opportunities. Pronghorn hunting visitor days would remain at 59.

No Action (NA) Alternative

Under the NA Alternative, demand for recreational activities would continue to increase in proportion to population growth.

Deer and pronghorn hunting visitor days would be expected to remain at the present level of 2,787 and 59 respectively.

Elimination of Livestock Grazing (ELG) Alternative

Implementation of the ELG Alternative would increase recreation opportunities. Removal of cattle and removal of rangeland improvements that serve no useful purpose would eliminate the existing and potential conflicts between recreation users and livestock. Recreational and ORV access would improve with removal of fences. Currently, a large amount of road maintenance occurs to provide access to rangeland improvements. Removal of these improvements would reduce the level of road maintenance of many existing roads. This could reduce access for all recreational activities.

Deer hunting visitor days would increase to approximately 13,216. This is an increase of 10,429 visitor days from the current level of use. Pronghorn hunting visitor days would remain at the present level of 59.

Maximization of Livestock Forage Production (MLFP) Alternative

An increase in rangeland improvements and AUMs would increase the conflicts between recreation users and livestock. Rangeland improvements and vegetative treatments located near existing and proposed recreation sites would further increase this conflict. Vegetative treatments are currently proposed within the Dona Ana Mountains and the Organ Mountains Recreation Lands.

It is expected that ORV use of areas subject to vegetative treatment would be restricted while the new vegetation responds. This would have the effect of both reducing overall ORV opportunity and concentrating ORV use in the remaining open areas.

Recreation and ORV access would be hampered with the construction of new fences.

Deer hunting visitor days would increase to approximately 6,243. This is an increase of 3,456 visitor days from the current level of use.

Pronghorn hunting visitor days would increase to 224 on public land. This is an increase of 165 visitor days from the current level of use. Pronghorn hunting visitor days would remain at the present level of 59.

Enhancement of Other Resource Values (EORV) Alternative

The EORV Alternative would impact recreational use of the Planning Area. Interaction and conflict between recreationists and livestock would continue.

Deer hunting visitor days would increase to approximately 6,243. This is an increase of 3,456 from the current level of use.

Social and Economic Conditions

Under the Proposed Action (PA), Maximization of Livestock Forage Production (MLFP), and Enhancement of Other Resource Values (EORV) Alternatives, the initial livestock forage allocation would be the same as the present 5-year average licensed use of 192,364 AUMs. This would be a decrease of 31,253 AUMs from existing preference. The livestock forage allocation following the monitoring period is not known at this time, but as discussed in Chapter 1, 165,500 AUMs would be the worst case allocation for the PA and MLFP Alternative and 102,610 AUMs for the EORV Alternative. Therefore, the social and economic impacts were analyzed using these figures. If monitoring studies prove these allocations to be too low, the impacts would not be as severe as stated in this section.

Proposed Action (PA)

Economic Conditions. The PA would impact neither the size nor the general characteristics of the total population within the Three-County Area. The ranch operators and members of their families who would be directly affected by changes in permitted levels of grazing comprised 0.7 percent of all residents of the area in 1980. While some short-term adverse economic impacts are projected on livestock ranches using public land within the Planning Area, these would not be associated with measurable shifts in patterns and employment and consequently, there would be no significant population movements.

Potential adjustments in grazing levels (after monitoring) would be a 14 percent decrease in permitted AUMs from 5-year average levels. This decrease would not occur if monitoring showed greater than expected amounts of forage. Individual permit holders might experience relatively greater adjustments from 5-year average grazing levels. Such a reduction would cut income from ranching significantly, but would not force termination of any operations. It is projected that under the PA most of the

785 persons who presently make up the ranching population would continue to live and work as at present, except that 30 operators and workers would have to obtain off-ranch employment to supplement reduced ranch income. Any other changes would occur because of factors not related to the PA, such as natural attrition of operators or economic adversity in beef markets.

The PA would not have significant impacts on the structure or source of employment in the region. The government, trade, and service sectors would continue to predominate and grow, while cattle ranching and rural areas would continue their relative decline in importance. The relatively small size of projected impacts on the income of ranch operators and workers, discussed below, would mean that no significant changes in the structure or size of personal income would occur.

After five years of monitoring, worst case adjustments would have a total effect of reducing permitted use by 26,864 AUMs or approximately 2,240 AUs below 1976-80 average levels. As a result of these cuts, livestock ranches would experience a reduction in full-time employment, leaving 180 full-time jobs on ranches. Earnings of operators and ranch workers would fall by an average of nearly $2,000 a year after adjustments, requiring many to find supplemental sources of income. However, the ranch operators and workers associated with livestock allotments in the Planning Area would continue to represent about 4 percent of the total agricultural employment and take home 5 percent of the total personal income from agriculture in the Three-County Area.

With such an overall cut in grazing on public land, a temporary increase in livestock sales would occur as herds were diminished by ranch operators and animals sold off. With an average reduction of 14 percent, livestock sales would rise by as much as $841,500 as herd sizes are reduced. Some ranches might continue to carry cattle which would no longer graze on public land by putting them onto private and state lands, or supplemental feeding pending results of further monitoring. In any case, the maximum increase in livestock sales would last no longer than a year, followed by a subsequent low which would be $990,000 below the average of the years 1976-1980. Net cash income would also be affected rising temporarily with reduction in animals but then falling by $505,000 a year.

The PA would have negative impacts on the wealth position of ranches. Ranches are valued by financial institutions on the number of AUMs they possess or control. With readjustment of the size of grazing allotments from preference to 5-year average levels, the valuation of ranches for bank purposes would be cut by 14 percent. This cut would mean a loss of approximately $2.5 million in ranch values, and a corresponding decrease in the financial flexibility of ranch operators. Most borrow in the short-term to finance their operations, but many also have engaged in long-term borrowing in order to purchase or improve ranch businesses. The PA would further affect the wealth position of ranch operators if adjustments were made in permitted grazing after initial monitoring. These cuts would result in a further decrease in ranch values of nearly $2.5 million.

In the long-term (no later than 2010) herd sizes of livestock ranches using public land in the Planning Area are projected to increase. The total number of AUs would climb to 34,750 or 9.9 percent greater than the 5-year average for the period 1976-1980. As a result, the economic position of livestock operators would resemble the description given in Chapter 2 but in most cases would be slightly improved. The increase in carrying capacities and grazing levels would benefit ranches in all size categories. Subsistence size operations would have average long-term sizes of 26 AUs, compared to 24 AUs during the 1976-1980 years and 19 after short-term cuts. For small commercial ranches, the comparison would be between 145 AUs, 123 AUs, and 106 AUs. Among medium commercial ranches the figure in 2010 would be 341 AUs compared to 316 AUs in 1976-1980 and 272 after cuts. Large commercial ranches would average 897 AUs in the long-term, having had a 5-year average of 870 AUs from 1976-1980 and 748 in the short-term. Livestock sales would grow to $7.6 million annually from $7.2 million in 1976-1980 and $6.2 million in the short-term.

Social Conditions. The PA would have no significant impacts on the character of the social networks or social values of the residents in the Planning Area. In most respects, the PA would be very similar to the No Action Alternative. Some temporary reductions in grazing levels would be implemented, but would reflect ranchers own levels of use over the past 5 years.

Even then, the PA as in other active rangeland improvement alternatives, stands in conflict with the typical rancher's desire to make independent management decisions. His values of independence and self-sufficiency support the view that as operator and long-term resident, he has the flexibility to monitor the day-to-day and month-to-month variations in the condition of the rangeland. Therefore, even reductions at this level preempts his ability to respond fast enough and flexibly enough to deteriorating or improving forage conditions. Nevertheless, the PA takes his lead in some measure by basing projected reductions in grazing levels on his own typical use patterns.

Even changes to the preference levels can be perceived by the ranching population as the erosion of a standard by which they have operated their ranches during their lifetime. The preference level remains as the leverage they have on the management of their land, and as a result the preference levels have some historical legitimacy for the ranching population. Most ranchers feel that current preference levels are equitable given recent climatic trends, but resist the idea of making trends in use levels the basis for changes in policy.

Summary. Under initial allocation, no change in livestock sales would occur. However, under the worst case at the end of the monitoring period, livestock sales would increase by about $800,000 due to reduction in animals then drop in the next four years by as much as $990,000 below 1976-1980 averages annually. By 2010 sales would be expected to increase above 1976-1980 average levels. A short-term drop of $505,000 in net cash income to ranches is projected, with a long-term gain of over $200,000. Market values of livestock ranches would initially drop by about $2.5 million, with further reductions of another $2.5 million with full implementation of grazing level adjustments. In the long-term, the economic position of affected ranches would, in most cases, be slightly improved.

No Action (NA) Alternative

Economic Conditions. The NA Alternative would have no impacts on regional population. The growth trends already established in the 1970's would persist. The City of Las Cruces and Dona Ana County would continue to grow. The urbanizing corridor between Las Cruces and El Paso would proceed at an annual growth rate between 2 and 3 percent. With this growth, there would be further encroachment on agricultural lands. Even though there has been some reversal in the population decreases of the rural areas, the general trend is toward urban concentration of the Planning Area population and decreasing rural density.

The ranching population would continue its historic decline, with slight decreases over the next three decades. Some consolidation of smaller ranch operations would occur, but overall the majority of livestock ranches utilizing permits in the Planning Area would remain cow-calf operations using local pasture and rangeland. Generally, the proportion of ranches in each of the size classes is expected to be the same, although long-term effects of fluctuating beef prices could translate into disproportionate reductions in the number of operations in the smaller size categories. A small and consistent decrease in the ranching population from a total in 1980 of 785 persons is expected. If recent trends continue regarding the population directly dependent on ranching operations, the number and size of families of ranch operations would decrease over the next 30 years.

By the year 2010, many of the current operators are expected to have retired, died, or relinquished everyday operations to younger members of the family. It is expected, however, that the rate of retiring operators would not be matched by an equal number of family members interested in continuing the operation.

The NA Alternative would have no impact on regional employment and income. The total number of employed persons in the Three-County Area would change proportionately with incremental increases in population. The government, trade, and service sectors would remain the prime employers and continue to dominate the income and occupation figures for the area. Generally, the total number of persons employed in the agricultural sector would remain at between 6 and 9 percent of the total employed population. It is expected, however, that the farm employment and income's yearly fluctuations, and long-term decline would continue.

The total number of persons employed on livestock ranches using public land in the Planning Area would not be expected to change appreciably from 1980 figures with the NA Alternative. Ranching would remain a small and steadily declining proportion of the total agricultural sector. Persons employed on ranches would continue to represent approximately 3-4 percent of the total agricultural employment in the Three-County Area. Likewise, the total contribution of agricultural income to the local economy would constitute about 5 percent. Total regional employment and personal income would remain at 1980 levels reflecting approximately 0.5 percent of the jobs and 0.4 percent of the earnings.

Livestock ranching in the Planning Area would remain marginally profitable only for the large commercial size operations. It is not expected that the condition of the rangeland would change appreciably from its current levels of forage production, but this would depend in part on a continuation of climatic conditions as have occurred in the past. Costs of raising livestock are projected to increase, at least in the short-term, especially energy costs. Cattle prices are expected to continue to fluctuate, yet as indicated in the discussion of current conditions, livestock sales would continue to exceed operating costs in all size categories.

The proportion of ranches with grazing permits on public land which serve as a primary source of operator's income would continue to decline in the current marginal to negative estimates of return on capital investment for small to medium size ranching operations. Continuing appreciation of the value of ranch land in the Planning Area would act to minimize the otherwise significantly negative return on the ranch investment. Nevertheless, depreciation of ranch equipment and other cash business costs would mean that net income of ranch operations using public land would remain low.

With rangeland forage production expected to remain approximately at current levels, the extent of dependency on grazing permits would not change.

Social Conditions. The NA Alternative would result in a continuation of current population growth patterns and commitment to the community development aspects of the ranching way of life. Urbanization would increase and growth in this sector would act to promote some value conflict with rural residents. This conflict is apt to increase somewhat as the declining ranch population becomes more dependent on outside employment and therefore comes into contact more frequently with urban counterparts. In general, however, these tensions and the values which generate them would not change measurably.

In summary, present social and economic conditions would continue largely unchanged, both in the region generally and among the ranching population.

Elimination of Livestock Grazing (ELG) Alternative

Economic Conditions. The ELG Alternative would have no significant impacts on the size or composition of the population of the SRGPA. With the population of the Three-County Area concentrated in Dona Ana County and the City of Las Cruces, the regional population would not be affected by adverse economic impacts projected for livestock ranchers. Smaller communities in the Hatch Valley, for instance, which depend more significantly on farm and ranching income would be more affected.

One-third of the total operations in the Planning Area or 49 ranches would be forced to close with the implementation of the ELG Alternative. Most current operators would be required to seek non-ranch jobs and other income sources. Approximately 75 persons directly tied to these ranch operations would be displaced. Many of these ranch operators and their families, because of the difficulty in finding suitable employment in the vicinity, would likely relocate to major population areas including Las Cruces. In the long-term, elimination of livestock grazing would effectively remove most of the ranching population. Some families would choose to relocate nearer urban centers while retaining some livestock on private or Forest Service lands, but this option would only be available to the largest operators.

In the short-term, the elimination of livestock grazing would reduce employment in the agricultural sector. Ranching employment involves 4.9 percent of that total. The most important components of the regional economy are the government, trade, and services sectors. Thus, even dramatic changes in the agricultural sector would not affect the general economy. Elimination of $2.7 million in ranch income would be small in comparison to the total dollar amount of personal income in the region, which is approximately $611,165,000.

Some ranch operators in the large size categories would survive an elimination of grazing on public land. Their continued operation would depend upon the level of their use of public land for forage. The small operator typically is more dependent on public land than the large operator. With a dependency of 70.5 percent, subsistence operators may choose to become hobby ranchers. In all likelihood, the majority would have to close out. In contrast, the large commercial operators would be dependent for only 40.7 percent of forage and may turn to a greater variety of options provided by access to privately owned or state leased lands.

Personal income would drop by $1,680,000 including decreases in income among operators and employees whose jobs would not be totally displaced and who would seek other sources of income. In the context of the regional economy, these impacts would be insignificant; but in terms of the ranching economy, they would be substantial. Employment in livestock production from public land in the Planning Area would drop by approximately 29.7 percent and personal income from this ranching would be decreased by 62.8 percent.

Social Conditions. As a result of the dramatic reductions in the short- and long-term grazing levels, the preeminence of social, community, and lifestyle incentives for staying in the ranching business would not be sufficient. Even though many permittees identify themselves as ranchers on attitudinal rather than economic grounds, the extent of this non-economic commitment could not be expected to persist. Large numbers of operators and their families would be forced to move from their ranches seeking livelihoods in urban areas. For many of the lifelong ranchers who are close to retirement, their ranching skills would not place them in an advantaged position in the urban job market. Small, rural communities that are primarily dependent on ranching and farming income would experience a dramatic decrease in patronage and revenues as well as a significant source of community leadership.

Summary. Significant social and economic impacts would be experienced by the ranch community. Forty-nine ranches would be forced to close. Approximately 75 persons employed on these ranches would lose their jobs. Ranch income would drop by about $2.7 million with a greater than 60 percent decrease in livestock sales. Only some ranch operators in the large size categories would remain in the rangeland livestock business following an elimination of grazing on public land.

Maximization of Livestock Forage Production (MLFP) Alternative

Economic Conditions. The MLFP Alternative would have no impacts on the overall size or composition of the population of the Planning Area. The ranch operators for whom this alternative would have the greatest effect would constitute below 1 percent of all residents in this area. This alternative would not induce any short- or long-term shifts in the area's population. In the short-term, impacts on the regional population would be negligible. In the long-term, benefits to the ranching population would be insignificant in the context of the total number of inhabitants of the region.

In the long-term, ranch production would increase in all categories. With maximization of forage, livestock sales are projected to exceed their level prior to implementation. Long-term benefits would accrue directly to the beef industry and related economic sectors. This benefit would be reflected in an increase in regional personal income of $540,000 or 0.1 percent.

Short-term adjustments in grazing levels due to the MLFP Alternative would reduce ranching income significantly, but would not force termination of any operations. Most of the 785 members of the ranching population would continue as at present, except that as many as 30 operators and employees would have to obtain supplemental employment. However, in the long-term, significant increases in herd sizes would result. The long-term effect of the MLFP Alternative would be to alter the size distribution of livestock ranches. The number of subsistence size operations would decrease by two and the small commercial operations would decrease by six. Medium and large operators would each increase by three, thus reflecting the gains in herd sizes and the net benefits to the larger operations.

Overall herd sizes would vary significantly by size category, but all herd sizes would increase. Operations in the subsistence category would experience a slight increase from 24 to 27 AUs. All other categories would have more dramatic increases in herd sizes. Small commercial size operations would increase from 123 to 161 AUs, a 30.8 percent increase. Medium commercial herd sizes are projected to increase 14.8 percent, from 316 to 363. The average herd size in large commercial size operations would increase 11.9 percent from 870 to 974.

The results of these changes in the long-term would mean that total livestock sales would increase significantly. Sales would increase to $8.7 million, up from 1976-1980 levels by $1.5 million. This would represent approximately a 12 percent increase in sales over current levels. Because of these increased sales, net cash revenues would be up by $1 million from 1976-1980 levels of $3.7 million.

The long-term effects on the financial position of the ranch operator would be beneficial. With average herd sizes increasing in all ranch size categories, ranchers would tend to increase borrowing. Loan valuations would increase by $3.3 million and market value of operations with allotments in the Planning Area increasing by an aggregate of $7 million up from 1980 assessments.

Social Conditions. With the MLFP Alternative, social and community impacts would be similar to the PA in the short-term. However, because of projected increases in herd sizes, ranch operators would benefit from greatly increased revenues in the long-term. Nevertheless, the recovery to 1980 preference levels would take approximately 20 years. With limited opportunity to expand operations, it remains uncertain how long heavily indebted operators would proceed based upon future promises of returns.

With the projected cuts in grazing levels based upon monitoring alone, the exact level of initial allocation cannot be determined. Vegetative treatments and the exact period of time allocated to "resting periods" awaits future estimates of the condition of the rangeland. From the social point of view, this strategy would create uncertainty regarding investment planning and inheritance patterns.

Summary. Short-term adjustments in grazing levels would have a negative impact on ranch income, and 14 percent of the affected operators and employees would need off-ranch income sources. In the long-term, significant increases in herd sizes would result, with corresponding benefits to the ranching population. Livestock sales would increase from 1976-1980 levels by $1.5 million, and net cash income would increase by nearly $1 million. Market values of livestock ranches in the Planning Area would be expected to increase by almost $7 million in the long-term.

Enhancement of Other Resource Values (EORV) Alternative

Economic Conditions. The EORV Alternative would have no significant impact on the size or the characteristics of the population of the Three-County Area. Direct impacts on the ranching population of the local area would involve only a small proportion of the Planning Area's total population. Continued rapid growth in the urban areas as well as expected dramatic increases in the proportion of the city to rural population means that changes in the agricultural sector would not necessarily translate into social or economic impacts in the urban areas.

Due to the projected short-term decreases in permitted levels of grazing, 16 ranch operators would be forced to close. These operators and their families would have to seek non-ranch jobs. The total reduction in the ranching population associated with the closure of these 16 operations would be approximately 80 persons. In the long-term, the projected slow recovery in the grazing levels would allow few of these ranches to reopen. Significant consolidation would appear likely with the EORV Alternative.

The EORV Alternative, on a short-term basis, would reduce employment in the Planning Area by 121 jobs or full-time equivalents. Most of these reductions would take place in the agricultural sector. This short-term reduction would represent about 0.4 percent of the 1980 employment in the Planning Area. This decrease in employment would reflect a drop in personal income of an estimated $3.7 million, of which $2.1 million would be ranch income.

While not being able to predict the specific outcome of monitoring activities as it relates to the adjusted implementation of this alternative, the assumption of the EORV Alternative is that permitted levels of grazing would not return to 1980 figures. Therefore, no long-term benefit would accrue directly to the beef industry and to related economic sectors. During maximum reduction in permitted grazing, income would be cut by $3.7 million. In the 30-year period (to the year 2010), the lost income to this ranching sector as a result of the implementation of this alternative would be $30 million.

With an average reduction in grazing levels of 39 percent over the long-term, livestock sales would be dramatically cut. Declining sales of $3 million would represent a 41.7 percent decrease in business activities. This would more than effectively eliminate the cash margins on which most small and subsistence operators survive.

The initial and estimated subsequent cuts in permitted levels would have severe impacts on the financial position of the rancher. Their ability to borrow money would be reduced by a total of $8.2 million or 40.2 percent. With many ranchers already heavily in debt, some would be threatened with default. Market values of ranch operations with BLM allotments would drop by a total of $18.9 million.

Social Conditions. High average cuts in permitted grazing levels in all size categories associated with the EORV Alternative would adversely affect the ranching community and its social stability. The expressed commitment to the ranching way of life appears to be an attraction in part to solitude, family, and traditional conservative values. The BLM's emerging role as moderator and manager of the multiple use concept tends to place it at odds with these deeply felt and historically based values. Monitoring strategies, while being a reasonable procedure for permitting some adjustments to grazing levels, over time in response to unforeseen changing conditions, could produce significant uncertainty and anxiety among livestock growers.

In both the short- and long-term, the EORV Alternative would have significant impacts on social returns and values. The longevity of many operators and significant patterns of intermarriage among ranch operators using public rangeland has generated a common definition and attachment to the land.

With encouragement of multiple use as it relates to the strategies for implementing the EORV Alternative, the ranchers and their values of independence, self-sufficiency, and control would increasingly come into contact with urban expectations regarding access to public land. The expectation is that growing urbanization in the Three-County Area along with the additional catalyst of BLM's implementation of the EORV Alternative would accelerate the pressure toward alternative uses of the public land.

Summary. Significant short-term reductions in permitted livestock grazing would lead to the closure of 16 ranches, the loss of 121 full-time job equivalents mostly in the agricultural sector, and the decrease in personal income of $3.7 million, including $2.1 million in ranch operator and worker income. Livestock sales would be reduced by more than $3 million. Market values of ranch operations with allotments on public land would drop by about $19 million. While total allocated AUMs are projected to eventually exceed 1976-1980 average levels, significant ranch consolidation would be likely in the long-term resulting in a reduced ranching population. Increased use of public land for activities other than ranching would be expected to bring the ranching population into greater conflict with other users.

TABLE 3-21

COMPARISON OF ESTIMATED ECONOMIC IMPACTS ON BIG GAME HUNTING VISITOR DAYS

Activity	Existing	Long-Term				
		Proposed Action	No Action	Elimination of Livestock Grazing	Maximization of Livestock Forage Production	Enhancement of Other Resource Values
Deer Hunting						
Visitor Days[a]	2,787	6,243	2,787	13,216	6,243	6,243
Value[b]						
Direct Income Effect	$47,379	$106,131	$47,379	$224,672	$106,131	$106,131
Regional Income Effect	$68,131	$152,616	$68,131	$323,078	$152,616	$152,616
Pronghorn Hunting						
Visitor Days	59	59	59	59	224	59
Value						
Direct Income Effect	$1,003	$1,003	$1,003	$1,003	$3,808	$1,003
Regional Income Effect	$1,442	$1,442	$1,442	$1,442	$5,475	$1,442

Source: BLM Las Cruces District Office EIS Team Files, 1980.

Notes: a/Visitor days correlate with estimated big game populations.
b/Base value for visitor days (adjusted to 1980 prices) and multiplier obtained from Southwest Research and Development Company, 1977.

Impacts on Non-Ranching Resources. Increased numbers of visitor days attributable to big game hunting have been projected for the long-term in the SRGPA under the PA and all of the alternatives except the NA Alternative. Direct income effects upon the retail trade and service sectors and indirect, regional income effects have been estimated as shown in Table 3-21. The dollar amounts are based only upon an estimate of additional expenditures which would be attributed specifically to the big game hunting activity. Per capita cost of living expenditures are not included.

Additionally, impacts on the social reactions of the general population, such as the enhancement of aesthetic or intrinsic values, and improved quality of life, would be expected in the long-term for all the alternatives except the NA Alternative. These kinds of impacts are not easily quantifiable, partly because of the subjectiveness and diversity of the perceptions of users and potential users of public land, but a positive value can be assumed. The impacts would result from the realization of multiple use and sustained yield objectives, such as the projections for increased wildlife habitat, soil erosion control, and increased vegetative ground cover. The Southwestern New Mexico Social-Economic Profile (1978) indicates that the regional amenities of outdoor recreation, physical beauty, and climate are highly valued by the general population of the Planning Area.

RELATIONSHIP BETWEEN SHORT-TERM USE OF MAN'S ENVIRONMENT AND LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

Under the PA, the EORV, and MLFP Alternatives, there would be a short-term loss of vegetation on 734; 826; and 1,067 acres, respectively and long-term loss on 114; 132; and 162 acres respectively due to the construction of rangeland improvements. Under the same alternatives, there would be a short-term loss of vegetation on 40,077; 40,077; and 779,104 acres respectively and a long-term increase of 4,618; 4,618; and 90,539 AUMs of forage due to vegetation treatments.

Under the NA Alternative, 1,438,784 acres would remain in poor condition or deteriorate.

Under the ELG Alternative, domestic livestock grazing would be eliminated from 2,146,034 acres of public land.

Under the PA and EORV Alternative, there would be a soil loss on 734 acres disturbed during construction of rangeland improvements. Increased soil erosion on 40,077 acres due to vegetation treatment would be offset by a long-term decrease of sediment yield due to increased cover.

Under the MLFP Alternative, soil loss on 798,171 acres in the short-term due to construction of rangeland improvements and vegetation treatment would be offset by decreased erosion on 797,104 acres with increased cover.

Deer populations would be expected to reach their optimum numbers in the long-term under the PA and all alternatives; except the NA Alternative. Antelope populations would be expected to reach their optimum numbers only under the MLFP Alternative.

Under the PA, there would be a short-term reduction of 58,117 AUMs from preference and 26,864 AUMs from average licensed use. In the long-term, there would be a decrease of 8,547 AUMs from preference and an increase of 22,706 AUMs from average licensed use.

Under the NA Alternative, there would be no decrease in AUMs in either the short-term or long-term. However, rangeland conditions would not improve and could deteriorate in some range sites.

Under the ELG Alternative, there would be no allocation of AUMs to livestock in the short- or long-term.

Under the MLFP Alternative, there would be a short-term decrease of 58,117 AUMs from preference and 26,864 from average licensed use. In the long-term, there would be an increase of 81,992 AUMs over preference and 113,245 over average licensed use.

Under the EORV Alternative, there would be a short-term decrease of 121,007 AUMs from preference and 89,754 from average licensed use. In the long-term, there would be a decrease of 9,257 AUMs from preference and an increase of 21,996 AUMs over average licensed use.

Under the PA, MLFP, and EORV, there would be an increase in water consumption by livestock and wildlife of 26; 126; and 25 acre-feet of water respectively in the long-term.

Under the PA, MLFP, and EORV Alternatives, there would be a minimal short-term increase in air pollution due to construction of rangeland improvements and vegetation treatments. This would be greater under the MLFP Alternative because of the increase in construction projects and vegetation treatments. In the long-term, air pollution would be less because of increased ground cover.

Under all alternatives except the ELG and NA Alternatives, livestock trampling of cultural resources would decrease in the short-term and increase in the long-term. The most severe trampling would occur under the MLFP Alternative. Site-specific EAs would partially mitigate the destruction of cultural resources under all alternatives.

Visual resources would be impacted by the construction of rangeland improvements and vegetation treatments. Most of the impacts would be mitigated by site-specific EAs prior to any construction or treatments.

No construction or treatment would be implemented in Wilderness Study Areas that would impair wilderness values.

Non-hunting related recreation days would be expected to increase under the PA and all alternatives in the long-term, because of a predicted increase in the human population. Big game hunting visitor days would increase under the PA, ELG, MLFP and EORV Alternatives by 3,456; 10,429; 3,621; and 3,456 visitor days respectively.

Under the PA, grazing use of public land in the SRGPA which would be foregone in the short-term would be exchanged for long-term improvement in the economic viability of the ranching community.

Under the NA Alternative, deferral of full provision for depreciation costs would be expected to effectively trade short-term enjoyment of ranching activities and lifestyles for a continuing decline in the long-term economic returns on the capital investments of ranching operations. However, livestock sales would continue to exceed operating costs.

Implementation of the ELG Alternative would eliminate short- and long-term social and economic returns from ranching on public land without assuring commensurate short-term increases in the social and economic productivity of other resources in the SRGPA. In the long-term, increases in social and economic productivity would accrue to other uses, including outdoor recreation.

Under the MLFP Alternative, short-term decreases in permitted grazing levels would ultimately be replaced by the greatest increase of all the alternatives. Long-term increases would be expected to exceed 1980 preference levels.

Implementation of the EORV Alternative would decrease livestock production and diminish the viability of the range livestock sector in the short-term in order to achieve higher levels of production from other resources. Long-term increases in permitted grazing levels would be expected to exceed 1976-1980 averages.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under the PA, MLFP, and EORV Alternatives, an irreversible loss of vegetation would occur on 114; 132; and 162 acres respectively where permanent rangeland improvements would be constructed. Also, under the same alternatives, the loss of soil through increased wind and water erosion as a result of vegetation treatments would be irreversible.

There would be an irreversible and irretrievable loss of potential knowledge resulting from future advances in archaeological techniques as a result of construction of rangeland improvements and vegetation treatment in all alternatives except the ELG. However, this would be partially mitigated by site-specific environmental assessments (EAs), survey, recordation, or excavation prior to the constructions or treatments. Irreversible and irretrievable losses from erosion, unauthorized collection, and vandalism would occur under the PA and all alternatives, although the majority of these losses could not be attributed to the PA or alternatives.

There would be an irreversible and irretrievable loss from construction or rangeland improvements, vegetation treatments, and operation of improvements which require fossil fuel. This would be partially mitigated by using windmills on wells whenever possible.

Implementation of the ELG Alternative would mean that net revenues, employment and personal incomes derived from ranching operations dependent upon public land would be lost, as well as the sustained pioneer traditions and lifestyles associated with ranching in the Planning Area.

Implementation of the PA would mean the expenditure of $2.5 million in federal government funds for improvement construction and vegetation treatments. With the MLFP Alternative, $14 million would be spent for vegetation and $7 million for improvement construction. Under the EORV Alternative, $369,000 would be spent for the construction of fencing for erosion control and riparian habitat improvement.

CHAPTER 4

CONSULTATION

AND

COORDINATION

CHAPTER 4

CONSULTATION AND COORDINATION

INTRODUCTION

This chapter discusses the consultation and coordination conducted in the preparation of the Draft Environmental Impact Statement (DEIS). The discussion includes the consultation, coordination, and public involvement during the planning, the development of the proposed action and alternatives, and the writing of the DEIS for the Southern Rio Grande Planning Area (SRGPA). A list of persons involved in the preparation of the EIS is provided in Table 4-1.

PUBLIC CONSULTATION/SCOPING

On April 21, 1978, letters were sent to all agencies, organizations, and individuals on the SRGPA mailing list requesting information for the Planning Area Analysis. On the same date, a "Land Use Planning and Zoning by Local Government Checklist" (Form 1600-3) was sent to county and city planning agencies throughout the area.

On August 14, 1978, news releases were sent to all news media on the district media list encouraging public involvement in the scoping and planning process.

On August 28, 1978, letters requesting scoping and planning information were sent to the following: the Forest Service (Gila, Lincoln, and Cibola); Council of Governments (Las Cruces and Silver City); Director, New Mexico Department of Game and Fish; Chairman, Luna and Dona Ana County Commissioners; and the Mayors of Las Cruces, Deming, Hatch, and Truth or Consequences.

On January 24, 1979, meeting announcements and workbooks on the BLM Planning System were sent to all agencies, groups, and individuals on the SRGPA mailing list. Meetings were held in Las Cruces (February 13, 1979), Truth or Consequences (February 14, 1979), and Albuquerque, New Mexico (February 15, 1979). The purpose of the meetings were to obtain information needed for the writing of the Management Framework Plan. Approximately 50 people attended the meeting in Las Cruces, 45 attended the meeting in Truth or Consequences, and seven attended the meeting in Albuquerque. Newspaper releases concerning the meeting were published in the following papers: the Las Cruces Sun News, Las Cruces Bulletin, El Paso Herald Post, Albuquerque Journal, Albuquerque Tribune, and Truth or Consequences Herald.

On April 14, 1980, letters were sent to all grazing permittees describing the Las Cruces District allotment analysis procedures, in which each permittee would be contacted individually by a range conservationist to tell them about the upcoming EIS and to gather information concerning their allotments. The allotment analysis was conducted from April through July 1980.

The SRGPA planning and EIS schedules were discussed at the Grazing Advisory Board meetings on April 18, May 6, and August 26, 1980. Members of the New Mexico Range Improvement Task Force, the State Land Office, and other individuals attended some of those meetings.

The SRGPA planning and EIS schedules and the proposed action were discussed at the initial meeting of the District Advisory Council on September 23, 1980.

The proposed action and alternatives were discussed at formal scoping meetings held in Las Cruces and Truth or Consequences on September 24 and 25, 1980, respectively. The purpose of the meetings were to determine the scope of the issues to be discussed in the EIS and to receive information from the public which would aid in the writing of the EIS. Approximately 500 letters were sent to agencies, groups, and individuals on the SRGPA mailing list, and press releases were sent to the District's media list. Twenty-four people attended the meeting in Las Cruces and 21 attended the meeting in Truth or Consequences.

The major issues and concerns that were discussed during the scoping meetings were:

Issues or Concerns	Responses
1. The elimination of livestock grazing is not feasible.	It is BLM policy that we analyze this alternative (WO Instruction Memo. No. 79-445). Analysis of this alternative will provide an indication of the adverse impacts or additional benefits, if any, of removing all livestock from public land.
2. Proposed new alternatives.	
a. Sell the public land.	Sale of the public land is a separate subject not applicable to this EIS.
b. Combine alternatives to come up with a new alternative.	This is possible during the decision making process. The decision maker does not have to select one alternative, but can select portions from any or all alternatives.

3. Concern about the accuracy of SVIM data.	The monitoring studies following the EIS will determine the accuracy of the SVIM data.
4. Concern expressed regarding social and economic impacts.	The social and economic concerns and impacts expressed at the public meetings are discussed in Chapter 3 of the EIS.
5. Concern expressed about using 780 pounds of forage per AUM.	This figure is given in "A Glossary of Terms Used in Range Management" published by the Society for Range Management. Monitoring studies may modify this figure.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED

One alternative was considered but not analyzed. The alternative was to use the Soil-Vegetation Inventory Method (SVIM) data to arrive at the proper livestock stocking level. The field work for this inventory was completed in 1978 and 1979 and was automated for the final phase. The initial plant production printouts received in November, 1980, contained apparent errors. Two major problems were found involving the mathematical summation of certain data and the phenological adjustment factors. These errors were corrected and another printout was received in late December, 1980.

Since receipt of the printout, additional field work was conducted on selected allotments to assess the accuracy of the data. The field work indicated that some of the data were accurate but other data, particularly in the mesquite dune vegetation type were inconsistent. Because of the rigid deadline in filing the EIS by September 1981, it was not possible to resolve these inconsistencies in the data and include this alternative in the EIS.

AGENCY COORDINATION

On December 4, 1980 formal consultation with the U.S. Fish and Wildlife Service was initiated by the EIS Team wildlife biologist in coordination with the BLM New Mexico State Office. (See Appendix D-4 for response.)

Consultation with the State's Historic Preservation Officer has been initiated to determine the adequacy of the cultural inventory and sites which are eligible or potentially eligible for inclusion in the National Register of Historic Places. (See Appendix H-1 for letter of consultation.)

BLM District personnel contacted representatives of various federal, state, and local agencies, private organizations, and individuals during the writing of the EIS. Members of the EIS Team contacted numerous individuals, including New Mexico State University professors and personnel from the New Mexico Department of Game and Fish during the preparation of the EIS.

Personnel from Harbridge House, the contractor for the social and economic sections of the EIS, held informal consultations with several federal, state, local and university groups as well as with individuals who may be impacted by the proposed action or alternatives.

PUBLIC REVIEW OF THE DEIS

The DEIS will be sent to and comments requested from the following agencies, interest groups, and individuals:

Congressional Delegation and New Mexico State Legislators

U.S. Senator Pete Domenici
U.S. Senator Harrison Schmitt
U.S. Representative Joe Skeen
State Senator Wyatt Atkins
State Senator Charlie Lee
State Senator J. J. (Jimmy) Rogers
State Senator Frank O. Papen
State Senator I. M. Smalley
State Senator Joseph A. Fidel
State Representative Von Rue Crawford
State Representative Brent Westmoreland
State Representative Ralph D. Hartman
State Representative William O'Donnell
State Representative Mary T. Thompson
State Representative Murray Ryan
State Representative James Lee Martin
State Representative John J. Mershon
State Representative Maurice Hobson
State Representative George E. Fettinger
State Representative Randall Sabine

New Mexico State Agencies

Office of the Governor
Environmental Improvement Division
Department of Game and Fish
State Historic Preservation Officer
Commissioner of Public Lands
State Engineer
State Planning Office
State Livestock Board
Bureau of Mines and Mineral Resources
State Parks and Recreation Department

New Mexico State Agencies (con't)

State Highway Department
State Oil Conservation
Department of Natural Resources
Department of Agriculture
State Clearinghouse
State Heritage Program
Department of State Forestry
Interstate Streams Commission
Museum of New Mexico
New Mexico State University
University of New Mexico
Western New Mexico University
Eastern New Mexico University

Federal Agencies

- U.S. Department of Agriculture
  - Forest Service
  - Soil Conservation Service
  - Agricultural Stabilization and Conservation Service
  - Environmental Quality Acts
  - Farmers Home Administration
- U.S. Department of the Army
  - Deputy Assistant Secretary of the Army
  - White Sands Missile Range
  - Fort Bliss
  - Holloman Air Force Base
  - Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Department of the Interior
  - Advisory Council on Historic Preservation

Federal Agencies (con't)

- Fish and Wildlife Service
- Water and Power Resources Service
- U.S. Geological Survey
- Bureau of Mines
- National Park Service
- Heritage Conservation & Recreation Service

U.S. Department of Justice

- Border Patrol
- Immigration and Naturalization Service

International Boundary & Water Commission

U.S. Department of Transporation

Regional and Local Agencies

Dona Ana County Commissioners
Luna County Commissioners
Otero County Commissioners
Sierra County Commissioners
Socorro County Commissioners
El Paso County Commissioners
Mayor, City of Las Cruces
Mayor, Village of Hatch
Mayor, Village of Williamsburg
Mayor, La Mesilla
Mayor, City of Deming
Mayor, City of Truth or Consequences
Mayor, Anthony
Mayor, Columbus
Mayor, El Paso
City Manager, Alamogordo
City Manager, Deming
City Manager, Truth or Consequences
Jornada Resource Conservation District
Southwest New Mexico Resource Conservation District
Caballo Soil and Water Conservation District
Sierra Soil and Water Conservation District
Southwest New Mexico Council of Governments
Southeast New Mexico Economic Development District
Southern Rio Grande Council of Governments

Regional and Local Agencies (con't)

Chamber of Commerce, Truth or Consequences
Chamber of Commerce, Las Cruces
Chamber of Commerce, Deming
Chamber of Commerce, Alamogordo
Chamber of Commerce, El Paso
County Agent, Dona Ana County
County Agent, Truth or Consequences
Director of Planning, Dona Ana County
El Paso Centennial Museum

Livestock Related Organizations

New Mexico Cattle Growers Association
Sierra County Farm and Livestock Bureau
New Mexico Farm and Livestock Bureau
New Mexico Range Improvement Task Force
Southwest Livestock Grazing Association

Professional Societies

New Mexico Wildlife Society
The Wilderness Society
American Fisheries Society
New Mexico Chapter, Society of Range Management
New Mexico Chapter, Society of American Foresters
Soil Conservation Society
Wildlife Society

Texas State Agencies

Office of the Governor
Budget & Planning Office
Dept. of Highway and Public Transportation
Texas Air Control Board
Texas Parks and Wildlife Department
Texas Historical Commission
Texas Tech University
University of Texas at El Paso

Conservation Organizations

Sierra Club
Albuquerque Wildlife Federation
New Mexico Wildlife Federation
The Wilderness Center
Albuquerque Environmental Center
New Mexico Citizens for Clean Air & Water
Jornado Experimental Range
Izaak Walton League
New Mexico Conservation Coordinating Council
New Mexico Wilderness Study Committee
Dona Ana County Assoc. Sportsmen
Sierra Sportsmen Association
New Mexico Wilderness Newsletter
San Andres Refuge
Speleological Society
New Mexico Ornithological Society
Albuquerque Geological Society
Albuquerque Archaeological Society
Central New Mexico Audubon Society
National Speleological Society
El Paso-Transpecos Audubon Society
El Paso Archaeological Society
Texas Archaeological Society
Mesilla Valley Audubon Society
Luna County Historical Society
Dona Ana County Historical Society
New Mexico Natural History Institute
National Council of Public Land Users
Natural Resources Defense Council
Wildlife Management Institute
Friends of the Earth
National Wildlife Foundation
New Mexico Association of Natural Resource Conservation Districts
Nevada Outdoor Recreation Association
Oregon Environmental Council
Public Land Council
Ada County Fish & Game League
Southwest Research & Development Co.
Human Systems Research

Other Groups

T or C Off-Road Association
Las Cruces Four Wheelers
Jim Huff's Four Wheel Drive Center
Las Cruces Motorcycle Club
El Paso 4X4 Club
Las Cruces ORV Club
Roadrunner Racing Association
Mesilla Valley 2000
Albuquerque Jeep Herders Association
Albuquerque Off-Road Runners, Inc.
Motorcycle Association of New Mexico
Prairie Dawgs Motorcycle Club
Otero County Riders Association
Gemcrafters and Employers
Sierra County Rock Club
Dona Ana County Rockhound Club
Deming Gem and Minerals Society
Hot Springs Gun Club
Picacho Gun Club
Orienteering Club
UNM Mountaineering Club
Boy Scouts of America, Yucca Council
New Mexico Radio Communications Department
Woodward-Clyde Consultants
Otero County Bird Club
New Mexico Association of Environmental Education
Southwest Mountaineers
Sunshine Valley Garden Club
New Mexico Oil and Gas Association
Water Resources Research Institute
Federal Land Bank

Individuals

Copies of the DEIS will be sent to all permittees, the Las Cruces District Advisory Board, the District Advisory Council, and all other individuals listed on the SRGPA mailing list.

HEARINGS

Public hearings will be held on this Draft Environmental Impact Statement. Notice for dates and times for these hearings will be announced in advance in the news media and the Federal Register.

TABLE 4-1

LIST OF PREPARERS

NAME	EIS RESPONSIBILITY	EDUCATION	EXPERIENCE
Ed Webb	Team Leader	B.S., Wildlife Management Utah State University	BLM - 17 yrs. Wildlife Specialist Area Manager Range Conservationist Environmental Coordinator
Robert F. Anderson	Technical Coordinator Land Use and Transportation	B.S., Agriculture (minor - Economics) Texas A&M University Accredited Rural Appraiser-Amer. Soc. of Farm Mgrs. and Rural Appr. (ASFM&RA)	BLM - 18 yrs. Area Manager Realty Specialist Range Conservationist 12 yrs. Farm & Ranch Operations
Tom Birch	Vegetation	B.S., Animal Production M.S., Range Management University of Wyoming	BLM - 19 yrs. Chief, Division of Operations Natural Resource Specialist Range Conservationist 11 yrs. Superintendent, Wyoming Agriculture Experiment Station
Bruce G. Call	Soils, Climate and Water	B.S., Agriculture (Range and Soil Science) New Mexico State University	BLM - 3 yrs. Range Technician Range Conservationist Soil Scientist USFS - 7 mos. Forestry Technician Soil Technician
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APPENDICES

APPENDIX A
RANGELAND CONSULTATION POLICY

APPENDIX A

NEW MEXICO BUREAU OF LAND MANAGEMENT
RANGELAND CONSULTATION POLICY
SECTION 8 PL-95-514

Purpose: Section 8 of PL-95-514 specifically requires consultation, cooperation and coordination with lessees, permittees and landowners, the district grazing advisory boards and any state agencies, hereinafter referred to as the target group, involved in the development, revision or evaluation of allotment management plans. It is the intent of the Bureau of Land Management, New Mexico, to expand the concept of consultation, cooperation and coordination into all phases of the grazing programs and, thus, compliment the congressional intent set forth in PL-95-514.

Introduction: The procedures apply specifically to the target group, but also apply to other interested publics such as the district advisory council, the New Mexico Range Improvement Task Force, and other interested parties, as well as other land administering agencies where applicable. These procedures consist of seven phases and are intended to ensure compliance with Section 8 of PL-95-514. These phases are:

I. Preplanning.

II. Inventory and Inventory Related Studies.

III. Development of Resource Management Plan and Environmental Impact Statement.

IV. Rangeland Management Program Documents Following Grazing Environmental Impact Statements.

V. Livestock Adjustments, Grazing Systems Allotment Management Plans, Revisions or Evaluations.

IV. Interim Range Studies Prior to Grazing Systems or AMP Implementation.

VII. Documentation.

Phase I
Preplanning

A. The District Manager or his representative will contact the target group at the beginning of the preplanning analysis to request their input into the identification of issues. Contacts will be made by certified mail to ensure proper documentation.

B. The District Manager or his representative will then meet with the target group or informally on a one-to-one basis with each group and each owner-operator to ensure that their ideas and concerns are considered.

C. Following steps A and B, all affected parties will be furnished, by certified mail, a summary of issues for their review and comment before finalization. A final revision will be mailed to each party.

Phase II
Inventory and Studies Related to Inventories

A. The District Manager or his representative will notify the target group, by certified mail, of the inventories and inventory related studies to be conducted with a proposed time frame.

B. Prior to the initiation of each inventory or inventory related studies, the target group will be notified, by certified mail, of the inventories and inventory related study.

C. Prior to the beginning of an inventory, or inventory related studies, the District Manager or his representative will notify the target group, by certified mail, to request their participation.

D. All inventory and/or study teams will stop at the ranch headquarters on the first day of the inventory or study. If the allottee is absent, a note will be left indicating the work being done and the locations of each crew. (See Section VII, Documentation.)

Phase III MFP-RMP
EIS Development

A. Consultation and coordination with the target group, along with interested publics, is required (see 43 CFR 1601.4) and will be carried out as stated in 43 CFR 1601.3, public participation.

B. The District Manager or his representative shall make contacts with the target group to request their involvement during the allotment analysis process (II.C. and D.). The results of the various inventories and studies, i.e., forage availability, proposed livestock adjustments, wildlife habitat needs, socio-economic needs, watershed needs, etc., will be discussed with these participants during this contact. The allotment analysis review will include discussion on the needs for AMP vs. no AMP, design of grazing systems, locating range improvements and land treatment potential, etc.

Phase IV
Rangeland Management Program Document

The District Manager or his representative shall make contact with State agencies, district grazing advisory boards and the New Mexico Range Improvement Task Force within 90 days following the filing of a final EIS to review the draft Rangeland Management Program Document. The thrust of this phase will be to seek mutual agreement on the Rangeland Management Program Document. In the event of disagreements, further consultation may be necessary with the district advisory council. It is essential that this phase be conducted in an atmosphere of mutual trust, coordination and consultation since all subsequent range related actions will hinge on this document.

Phase V
Livestock Adjustments, Grazing Systems, Allotment Management Plans, Revision or Evaluation

A. Prior to the implementation of specific livestock adjustments, AMPs, grazing system or range improvement programs, the target group will be contacted by certified mail, asking them to what extent they wish to be involved.

B. Individual allottees and the State Land Commissioner will be contacted prior to each adjustment of grazing use and in the development, revision or evaluation of each AMP or other livestock management considerations.

C. The target group will be periodically informed and will be invited to review the progress at any time.

Phase VI
Interim Range Studies Prior to Grazing Systems AMP Implementation

Contact will be made with the target group informing them of the intent and procedure to be used in establishing interim range studies. Use the contact procedure identified in II.C and D.

Phase VII
Documentation

A. Documentation of all contacts whether by mail, in person, by telephone, etc., is mandatory. Documentation shall be kept in chronological order and properly filed.

B. During inventories or studies, the area manager will maintain a daily log or diary indicating pertinent information, such as who worked where, hours spent on quality control with each team, contact with the public, etc.

C. All information is available at the district office for review. Summary of study data will be made available upon request.

APPENDIX B
VEGETATION

METHODOLOGY

Soil-Vegetation Inventory Method (SVIM)

Instructions for completing the soil-vegetation inventory, which was used for completing the vegetative inventory in the Southern Rio Grande Planning Area, are described in BLM Manual 4412.14.

This procedure can be described in four distinct phases. Typing or mapping, transecting, compilation and computation.

Typing or mapping was done by soil-vegetative units on aerial photos. Vegetation was typed according to dominant species aspect. These units were then further divided to delineate areas with similar plant species composition and density. A preliminary rangeland condition rating was determined and if needed the mapping unit was again divided into units of similar condition. The final mapping unit was an area of similar vegetation in a similar rangeland condition occurring on the same soil and range site. These units were then considered to be a Site Write-up Area (SWA).

Sampling of each SWA was done by transects traversing the soil-vegetative unit in a manner which obtained a representative sample of the SWA. A minimum of one 200-point pace transect was completed for each SWA. Information recorded at each 200 points along the line include basal hits identifying ground cover as live vegetation, litter, gravel, cobbles or stones, bare ground or bedrock. Live vegetation was identified by plant species. Hits were identified by a notch on the toe of the sole of the transector's boot 1/8 inch wide and 1/16 inch deep. Canopy vegetative cover at three levels, if present, which occurred above the notch in the boot was recorded.

Information on vegetation production and plant characterization was obtained at ten evenly spaced plots across the SWA along the transect line. Weight-estimate plots of 9.6 or 19.2 square feet were used. At least two of the ten plots were clipped and weighed. Green weight in grams for each plant species occurring in the plot was recorded. Data on average availability, phenology and utilization were obtained for each plant species within the weight estimate plot. Form and age class for each plant of grasses and forbs and average height by grass and forb species with totals for each category were also recorded.

Shrub and tree characterization plots 1/100 acre in size were established in at least three of the ten locations along the transect. The data recorded included form and age class for five shrubs and trees of each species, average height and crown diameter by species and total number of plants by species.

Data required to develop factors to adjust vegetation production recorded at the time of inventory to maximum production for the season were gathered at intervals throughout the growing season in the inventory area. All major plant species were clipped and weighed and the dimensions of the plants were recorded for all phenology stages.

Precipitation data were gathered from official weather stations to develop a factor for adjusting vegetation production to a long-term average of growing season rainfall.

Compilation of acres by land status for each SWA and allotment totals were completed after the field inventory was finished. Adjustment factors used to convert green weights to dry weights were determined from samples collected during the inventory, air dried and percentages of dry weight to green weight calculated.

All major mathematical computations were done by computer in the BLM's Denver Service Center. The first calculation converted green weight in grams to dry weight in pounds. Adjustments were made for availability for grazing by livestock where field data indicated this was needed. A phenological adjustment factor was used to convert all field data to maximum production for the entire growing season. A utilization adjustment factor was made to compensate for any grazing use made on plants prior to time of field sampling. A precipitation adjustment factor was used to adjust all production figures to be in accordance with any departures from the long-term average growing season rainfall. The final calculations computed total production of each vegetative species in pounds per SWA.

An analysis of the final calculated data indicates some inconsistency in pounds of vegetative production between areas of similar type vegetation with similar species composition and density. This inconsistency was most noticeable in areas where the vegetation grows in patterns which are not uniform, primarily dune type mesquite vegetation.

This inconsistency is attributed to plot size and number of plots sampled. Insufficient number of samples or size of the area sampled would tend to overestimate the production as often as it would underestimate the production.

Because of the indicated inconsistencies, forage production data derived from the survey was not used for determining grazing capacity on individual allotments. It was, however, used as a basis for describing the existing environment and assessing the impacts on the proposed action and various alternatives. This assessment was done by averaging numerous numbers from the various range sites and vegetative subtypes. The averaging process would eliminate most of the inconsistencies of overestimation or underestimation which existed in the field data.

METHODOLOGY

Determination of the Estimated Changes in Production and Percent Composition of Desirable and Intermediate Forage Species and Each Ecological Condition and Forage Value Class

Estimated changes in production and the percent of the total plant cover comprised of desirable and intermediate forage species were made from data presented in Appendix B-6. These estimated changes were determined for the proposed action and all the various alternatives based on the different intensities of grazing use and the chemical or mechanical treatments proposed. This determination was made on each vegetative subtype on each different range site for each of the different ecological condition classes which contained data from the field inventory.

Because of the limited data for some vegetative subtypes, it was decided to lump the data into three broad vegetative types; grass, brush, and pinyon-juniper. These categories were used to have a better basis for comparison. The broad grass type includes all the grass subtypes, the yucca, sotol and the forb. Forbs were included because most of these areas include considerable amounts of grass. The pinyon-juniper type includes the pinyon subtype, the juniper subtype, the pinyon-juniper subtype, oakbrush, mountain mahogany and mixed mountain shrub subtypes. All other vegetative subtypes included in Appendix B-6 were grouped into the brush type.

Weighted averages were determined using the number of transects for each vegetative subtype shown in Appendix B-6. For presentation in Chapter 3, these were combined by averages for the three broad vegetative types regardless of range site.

Three factors influenced the degrees of change which were projected to occur under the proposed action and the various alternatives: (1) studies showing changes which occur under various intensities of grazing use; (2) the differences which exist in production and species composition between the three different ecological condition classes indicating that with a change in management the potential for change is present and; (3) professional judgement.

Cable and Martin (1964) indicate moderate utilization of the perennial grasses combined with alternate-summer deferment of grazing resulted in marked rangeland improvement. Blydenstein, et al. (1957) report the most notable change under the protection is a marked increase in density of the vegetation. Potter and Krenetsky (1967) indicate on a desert grassland type cover increased under protection about 60 percent with the relative cover of grasses increasing from 23 to 70 percent of the vegetation. Valentine (1970) reports different levels of use produce differences in vigor of black grama. Dickson, et al. (1948) report studies that after six years light grazed pastures have 30 percent more cover than heavy grazed pastures.

Changes which were projected to occur in the acres in each ecological condition and forage value class were based on the potential which exists for each site write-up area and the projected change in production and percent of the total composition comprised of desirable and intermediate forage species for the proposed action and the various alternatives. On some areas the existing vegetation and low potential would preclude any improvement.

Based on the point system of 0-25 being poor, 26-50 fair, 51-75 good, and 76-100 excellent for the four ecological condition classes, the projected changes for the proposed action and the various alternatives were determined as follows:

Proposed Action - no improvement on areas with 0-10 rating. Improve from poor to fair on 16-25 rating and fair to good 41-50 rating.

No Action Alternative - Decline from fair to poor on areas with 26-30 rating and good to fair on 50-55 rating.

Elimination of Livestock Grazing Alternative - Improve from poor to fair on 11-25 rating and fair to good on 36-50 rating.

Enhancement of Other Resource Values Alternative - A midpoint between the Proposed Action and the Elimination of Livestock Grazing Alternative was used.

Maximization of Livestock Forage Production - Those areas receiving either chemical or mechanical treatments were raised one condition class based on the project decrease in brush type vegetation and increase in grass species.

The projected changes in the forage value classes were based on a ratio of acres in poor ecological condition to acres in poor forage value, acres in fair ecological condition to acres in fair forage value and good to good which exists at the present time and using the same ratios for the projected changes under the proposed action and various alternatives.

All changes whether under the proposed action or any of the alternatives are the projected changes which would occur by the year 2010.

METHODOLOGY

Ecological Condition Class

The ecological condition of areas within a range site was determined by comparing the present plant community with the climax plant community, as indicated by the rangeland condition guides for the site.

Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax community (SCS 1976). The four classes are:

Rangeland Condition Class	Percentage of present plant community that is climax for the range site
Excellent	76-100
Good	51-75
Fair	26-50
Poor	0-25

Percent composition of each species of the existing plant community cannot exceed the percent composition of the same species which count as climax, as shown on the guide for the climax plant community. The amount of all climax species not in excess of that shown on the guide is totaled to indicate the relative ecological rating. This rating will be between 0 and 100. An example of the calculations for a loamy range site occurring in the Western Plateau MLRA is shown below.

Plant	Maximum Percent Composition	Present Percent Composition	Adjusted Percent Composition
Aristida	2	3	2
Sideoats grama	10	1	1
Blue grama	30	87	30
Apacheplume	0	6	0
Prickly pear	3	2	2
			35

Total adjusted rating was 35 which indicates a fair ecological condition rating. The primary reason for a low rating of 35 for this site was the lack of other species which would occur in a climax plant community. (see Appendix B-7 for potential plant community guide for loamy range site WP-3).

No adjustments were made for total weight of forage produced compared with the potential, therefore, the condition class ratings used are not based upon the variations in total production for any specific site and only reflect plant species compositions.

APPENDIX B-4

Forage Value Class

The forage value ratings were determined using procedures described in BLM Instruction Memo No. 74-120 with certain modifications. The criteria relative to soil surface factors were omitted and only those pertaining to quality and quantity of the vegetation were considered.

Major plant species in the Southern Rio Grande Planning Area were classified into three categories: desirable, intermediate, and least desirable. This classification was based on palatability and productivity, dominance under climax or near climax conditions, longevity of the species and the importance of the species to improving rangeland conditions.

Standards used to determine forage value ratings are as follows:

1. Good condition: Composition is 40 percent or more of both desirable and intermediate species with at least 20 percent made up of desirable species.

2. Fair condition: Composition is 15-39 percent of desirable and intermediate species with 5 or more percent made up of desirable species. Also composition is 60 percent or more of both desirable and intermediate species with less than 5 percent desirables.

3. Poor condition: Composition less than 15 percent desirable and intermediate species.

Vegetation has different values for different kinds of grazing animals. What might be called good for one animal species may not be for others. The plant species shown in the desirable and intermediate category below are the classification given for cattle only. Major plant species not shown were placed in the least desirable category.

Desirable

Grasses

Sideoats grama
Black grama
Blue grama
Hairy grama
Arizona cottontop
Plains lovegrass
Hairy tridens
Tanglehead
Junegrass

Intermediate

Bluestem
Prairie beardgrass
Cane bluestem
Silver bluestem
Finger grass
Windmill grass
Saltgrass
Spike pappusgrass
Tobosa

Desirable	Intermediate
Grasses	
Wolftail	Bullgrass
Sand muhly	Spike muhly
Arizona muhly	Switchgrass
Mountain muhly	Bottlebrush squirreltail
Mesa muhly	Alkali sacaton
Bush muhly	Hall panic grass
Green spangletop	Giant dropseed
Arizona panic grass	Sacaton
Vine-mesquite	Slim tridens
Spike dropseed	Plains bristlegrass
Mesa dropseed	
Sand dropseed	
Southwestern needlegrass	
New Mexico feathergrass	
Shrubs & Brush Species	
Fourwing saltbush	Sand sage
Desert buckbrush	Tubercled saltbush
Mountain mahogany	Obovate-leaf saltbush
Wrights buckwheat	False mesquite
Winterfat	Buckbrush
	Feather peabush
	Torrey ephedra
	Mexican tea
	Apacheplume
	Cliff fendlerbrush
	Wrights silktassel
	Range ratany
	Bull cods

APPENDIX B-5

MAJOR PLANT SPECIES IDENTIFIED IN THE SOUTHERN RIO GRANDE PLANNING AREA[a]

GRASSES

SCIENTIFIC NAME	COMMON NAME
Aristida spp.	Threeawn
adscensionis	Six-week threeawn
divaricata	Poverty threeawn
longiseta	Red threeawn
ternipes	Spidergrass
wrightii	Wright threeawn
Bothriochloa barbinodis	Cane bluestem
saccharoides	Silver bluestem
Bouteloua aristidoides	Needle grama
barbata	Six weeks grama
curtipendula	Sideoats grama
eriopoda	Black grama
gracilis	Blue grama
hirsuta	Hairy grama
Digitaria californica	Arizona cottontop
Enneapogon desvauxii	Spike pappusgrass
Eragrostis spp.	Lovegrass
Erioneuron pulchellum	Fluffgrass
Heteropogon contortus	Tanglehead
Hilaria mutica	Tobosa
Leptochloa dubia	Green sprangletop
Lycurus phleoides	Wolftail
Muhlenbergia spp.	Muhly
arenacea	Ear muhly
arenicola	Sand muhly
monticola	Mesa muhly
porteri	Bush muhly
torreyi	Ring muhly
Munroa squarrosa	False buffalo grass
Panicum spp.	Panic grass
hallii	Hall panic grass
obtusum	Vine-mesquite
virgatum	Switchgrass
Scleropogon brevifolius	Burrograss
Setaria leucopila	Plains bristlegrass
Sporobolus airoides	Alkali sacaton
contractus	Spike dropseed
cryptandrus	Sand dropseed
flexuosus	Mesa dropseed
wrightii	Sacaton
Tridens muticus	Slim tridens

MAJOR PLANT SPECIES IDENTIFIED IN THE SOUTHERN RIO GRANDE PLANNING AREA[a/]

SHRUBS, HALF SHRUBS, AND TREES

SCIENTIFIC NAME	COMMON NAME
Acacia constricta	Whitethorn acacia
Aloysia wrightii	Wright spicebush
Artemisia filifolia	Sand sagebrush
ludoviciana	Sagewort
Atriplex acanthocarpa	Tubercled saltbush
canescens	Fourwing saltbush
obovata	Obovate-leaf saltbush
Baccharis pterinoides	Yerba-de-pasmo
Berberis haematocarpa	Red barberry
trifoliolata	Algerita
Brickellia californica	California brickelbush
laciniata	Cutleaf brickelbush
Ceratoides lanata	Winterfat
Cercocarpus montanus	Mountain mahogany
Chilopsis linearis	Desert willow
Coldenia canescens	Spreading coldenia
Dalea formosa	Feather peabush
scoparia	Broom dalea
Dasylirion wheeleri	Wheeler sotol
Dyssodia acerosa	Prickleleaf dogweed
Echinocactus spp.	Barrel-cactus
Echinocereus spp.	Hedgehog cactus
Ephedra torreyana	Torrey ephedra
trifurca	Long-leaf ephedra
Ericameria laricifolia	Turpentine bush
Eriogonum wrightii	Wright's buckwheat
Fallugia paradox	Apacheplume
Flourensia cernua	Tarbush
Fouquieria splendens	Ocotillo
Hymenoclea monogyra	Burrobush
Juniperus deppeana	Alligator juniper
monosperma	One-seeded juniper
Koeberlinia spinosa	Crown-of-thorns
Krameria parvifolia	Range ratany
Larrea tridentata	Creosotebush
Lycium pallidum	Pale wolfberry
Mammillaria spp.	Pincushion cactus
Menodora scabra	Rough menodora
Mimosa biuncifera	Catclaw mimosa
Nolina microcarpa	Beargrass

MAJOR PLANT SPECIES IDENTIFIED IN THE SOUTHERN RIO GRANDE PLANNING AREA[a]

SHRUBS, HALF SHRUBS, AND TREES

SCIENTIFIC NAME	COMMON NAME
Opuntia engelmannii	Engelmann pricklypear
filipendula	Pricklypear
imbricata	Tree cholla
leptocaulis	Christmas cactus
Pinus edulis	Colorado pinyon pine
Prosopis glandulosa	Honey mesquite
Quercus spp.	Oak
Rhus aromatica	Skunkbrush
microphylla	Littleleaf sumac
Tamarix ramosissima	Salt cedar
Viguiera longifolia	Longleaf goldeneye
stenoloba	Slimleaf goldeneye
Xanthocephalum sarothrae	Snakeweed
Yucca baccata	Banana yucca
elata	Soaptree yucca
torreyi	Torrey yucca
Zinnia grandiflora	Rocky Mountain zinnia
pumila	White flowered zinnia
Ziziphus obtusifolia	Graythorn

MAJOR PLANT SPECIES IDENTIFIED IN THE SOUTHERN RIO GRANDE PLANNING AREA[a]

FORBS

SCIENTIFIC NAME	COMMON NAME
Allionia incarnata	Trailing allionia
Allium spp.	Onion, garlic
Amaranthus spp.	Pigweed, amaranth
Ammocodon chenopodioides	Moonpod
Astragalus spp.	Loco weed
Astragalus mollissimus	Wooly loco weed
Aster spp.	Aster
Bahia absinthifolia	Field bahia
Baileya multiradiata	Desert marigold
Boerhaavia spp.	Spiderling
Cassia bauhinioides	Arizona senna
Chenopodium album	Lamb's quarters
Chamaesaracha coniodes	Pale false-nightshade
Cryptantha spp.	Hidden flower
intermedia	
* *paysonii*	
Croton pottsii	Leather-weed
Dalea spp.	Peabush, Indigo bush
Descurainia pinnata	Pinnate tansy mustard
Dithyrea wislizeni	Spectaclepod
Dyssodia spp.	Dogweed
neomexicana	New Mexico dogweed
papposa	Fetid marigold
pentachaeta	Common dogweed
Erigeron spp.	Fleabane
Eriogonum spp.	Wild buckwheat
Euphorbia spp.	Spurge
albomarginata	Rattlesnake weed
Evolvulus spp.	Evolvulus
Helianthus spp.	Sunflower
Hibiscus spp.	Rosemallow
Hoffmanseggia glauca	Sicklepod rushpea
jamesii	Hog potato
Hymenoxys odorata	Bitterweed
richardsonii	Pingue
scaposa	Rubberweed
Iva dealbata	Wooly slumpweed
Kallstroemia spp.	Caltrop
Krameria lanccolata	Trailing ratany
Lepidium spp.	Pepperweed
montanum	Mountain pepperweed

MAJOR PLANT SPECIES IDENTIFIED IN THE SOUTHERN RIO GRANDE PLANNING AREA[a/]

FORBS

SCIENTIFIC NAME	COMMON NAME
Lesquerella fendleri	Fendler bladderpod
gordonii	Gordon bladderpod
Leucelene ericoides	White aster
Machaeranthera spp.	Aster
Melampodium leucanthum	Blackfoot daisy
Mirabilis spp.	Four o'clock
Oenothera spp.	Evening primrose
Pectis spp.	Fetid marigold
Pectis papposa	Chinchweed
**Penstemon lanceolatus*	Scarlet-tube beardtongue
Perezia nana	Dwarf desert holly
Phacelia intermedia	Scorpionweed
Polygala spp.	Milkwort
Portulaca spp.	Purslane
Psilostrophe tagetina	Wooly paperflower
Rumex hymenosepalus	Curlyleaf dock
Salsola kali	Tumbleweed
Senecio longilobus	Threadleaf groundsel
Sisymbrium spp.	Mustard
Solanum elaeagnifolium	Horse nettle
Sphaeralcea spp.	Globemallow
Talinun angustissimum	Yellow flameflower
Tidestromia lanciginosa	Tidestromia
Tragia spp.	Noseburn
Tribulus terrestris	Puncture vine
Verbena spp.	Verbena

Source: BLM Las Cruces District Office SVIM Data, 1980.

Notes: a/ A complete list of plant species found during 1978-79 SVIM Survey is available in the Las Cruces District Office.

* Indicates Species on New Mexico State Heritage Program List.

APPENDIX B-6

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a]													
							Grass						Shrubs						Forbs	
							D		I		L		D		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Southern Desert MLRA 42-S02 Gravelly Range Site - 042X010NTX																				
Perennial forbs	(1)[b] Poor	Fair	411	6	5	21	7	11	11	6	26	44					27	6	31	35
Short grass	(3) Poor	Fair	503	19	9	26	5	13	41	26	18	32				1	1	6	35	21
	(2) Fair	Good	501	18	17	4	38	17	2	6	50	58	3			7	4	9	3	4
Mid grass	(10) Poor	Fair	854	22	10	21	13	16	47	37	20	19			1	1	10	19	9	7
	(10) Fair	Good	526	17	11	14	29	29	14	15	13	15			1	2	20	27	19	15
Creosotebush	(30) Poor	Fair	322	14	7	30	6	8	11	7	21	18			3	2	55	63	4	2
	(30) Fair	Fair	327	17	9	20	12	11	7	5	14	10			3	3	45	57	21	11
	(6) Good	Good	613	20	11	10	43	30	5	3	8	11			1	1	31	40	11	16
Tarbush	(9) Poor	Fair	329	14	11	36	16	3	5	9	13	8					62	75	5	5
	(2) Fair	Poor	199	11	7	30	2	2	1	5	13	25					71	54	15	14
Mesquite	(4) Poor	Poor	548	26	12	40	2	5	33	31	8	3					38	49	19	15
	(1) Fair	Fair	341	17	12	63	21	21	3	4	7	23					50	15	18	36
Mixed desert shrub	(10) Poor	Fair	545	13	12	29	6	14	13	13	12	15			1	3	57	45	10	10
	(9) Fair	Fair	410	15	7	23	20	9	8	11	18	11		1	1	1	41	61	11	5
Yucca	(2) Poor	Poor	1,688	27	14	34	3	2	58	68	9	14					25	14	4	3
	(1) Fair	Good	588	17	6	56	56	47	1	18	20	18					11	12	12	6
White thorn	(3) Poor	Poor	331	13	10	14	7	3	1		6	5			4	1	71	87	11	4
	(2) Fair	Fair	127	16	9	16	4	2	2		9	2			24	30	63	67	1	
Mariola	(1) Fair	Fair	613	17	5	6	34	17			23	24			5	2	39	57		
Snakeweed	(10)[b] Poor	Fair	393	12	11	28	15	20	8	4	16	20			1	2	43	44	16	9
	(8) Fair	Good	391	14	8	13	31	24	10	10	10	6	1	1	1	1	41	55	7	3
Burrobush	(1) Poor	Poor	591	24	20	29	2	4		1	7	7			5	17	88	67		
Ocotillo	(1) Fair	Fair	1,268	21	12	5	22	18	2	3	4	8			1	2	69	64		7
Sacahuista	(1) Poor	Poor	224	14	15	9	11	21		3	36	24					35	45	15	9
Other shrubs	(1) Poor	Good	855	30	14	41	43	33	8	8	36	46						6	10	35
	(1) Fair	Fair	477	12	8	18	30	48			33	14			1	3	33	37	4	
Pinyon-juniper	(1) Poor	Good	435	25	17	3	34	19	6	6	4	3	7	11			37	48	12	14
Juniper	(2) Poor	Fair	263	26	9	12	30	28	6	5	25	12			3		13	49	22	6
	Weighted Average[c]		445																	
Deep Sand Range Site - D42X011NTX																				
Mid grass	(2) Poor	Fair	811	24	22	48	17	35	66	45	9	16							6	2
Creosotebush	(10) Poor	Poor	350	13	10	58	4	4			5	8		1	1	2	48	61	43	27
Broom dalea	(7) Poor	Poor	636	19	12	50	8	11			7	2	1	4	2	2	39	48	42	33
Mesquite	(24) Poor	Fair	393	13	10	65	6	5	2	2	6	6	8	4	4	2	39	58	34	24
Mixed desert shrub	(6) Poor	Fair	272	10	9	5	2	2			12	10	3	3	23	7	31	65	29	13
Sand sage	(1) Poor	Poor	438	16	2	79	8	19			2				3	33	20	23	68	26

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a]													
							Grass						Shrubs						Forbs	
							O		I		L		O		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Yucca	[b] (2) Poor	Good	533	21	14	60	35	12	6	2	6	4			3	1	14	38	36	42
	(3) Fair	Fair	516	17	13	62	16	23	33	23	11	8		2			3	25	37	17
Snakeweed	(1) Poor	Fair	1,047	17	17	59	26	61	7	6		2					59	27	6	4
Mormon Tea	(1) Poor	Fair	883	10	9	70	16	28	1	16	11	12			53	9	2	6	16	27
Other shrubs	(2) Poor	Poor	313	16	18	48		2	7	6	4	2					15	38	75	52
	Weighted Average[c]		445																	
Sandy Range Site - D42X012NTX																				
Perennial forbs	(2) Poor	Poor	652	9	6	68	7	3			8	29			2	6	25	11	56	54
Short grass	(2) Poor	Poor	693	21	12	50			33	33	39	37					4	13	22	16
	(1) Fair	Good	755	16	25	50	59	38	12	18	10	4					5	29	11	10
Mid grass	(10) Poor	Fair	1,013	17	11	58	13	11	28	30	13	16			2	1	13	11	30	32
	(5) Fair	Good	609	15	9	60	33	33	14	20	18	19			4	1	25	17	6	10
	(1) Good	Good	294	15	20	53	35	64	11	2	24	14					20	11	11	7
Tall grass	(1) Poor	Fair	241	23	25	44	8	3	50	81	17	3					1	7	25	6
Creosotebush	(10) Poor	Poor	309	12	12	53	2	1	1	2	6	6	1	1	1	2	71	73	20	15
	(2) Fair	Good	143	14	12	58	20	18	20	10	8	6			10	3	40	61	4	3
Tarbush	(6) Poor	Fair	218	17	8	61	10	9	20	18	9	10					53	61	8	2
Broom dalea	(2) Poor	Poor	1,228	26	12	41	8	21			2	2	2			1	49	42	39	36
Mesquite	(30) Poor	Fair	390	16	12	58	5	6	5	4	4	3	2	3	3	2	50	65	30	18
	(8) Fair	Fair	474	19	16	52	21	18	14	10	14	14	1	1		1	24	44	24	12
Mixed desert shrub	[d] (10) Poor	Poor	342	13	13	56	4	8	1	2	7	3			7	5	46	60	34	22
	(3) Fair	Good	463	13	11	62	23	32			12	20			33	9	13	32	18	10
Yucca	(10) Poor	Fair	638	16	9	62	14	12	3	4	9	12			1	1	39	46	33	24
	(1) Fair	Fair	197	15	11	58	39	44		2	8	4		2			34	12	18	34
White thorn	(5) Poor	Fair	703	19	8	60	9	4	5	10	7	7			15	2	21	37	42	41
Snakeweed	(10) Poor	Fair	646	10	8	58	12	13	1	2	4	4			8	5	29	44	46	32
	(4) Fair	Fair	590	16	7	48	12	23	4	1	28	13			2	1	13	24	41	37
Morman tea	(4) Poor	Good	1,054	14	9	60	23	8	10	6	1	3			11	19	12	27	43	37
Sumac	(4) Poor	Poor	567	15	9	65	6	8	1	4	5	7	2	1		1	35	46	50	35
Other shrubs	(6) Poor	Fair	477	15	14	62	16	7	12	10	16	11			2	2	45	61	6	7
	Weighted Average		532																	
Loamy Range Site - 042X014NTX																				
Short grass	(6) Poor	Fair	333	14	18	54	14	10	10	13	62	64			2	2	8	7	6	3
Mid grass	(10) Poor	Fair	866	20	12	53	10	13	70	63	7	14				2	2	4	8	7
	(6) Fair	Good	662	15	11	64	35	35	29	17	13	20			2	1	10	12	13	15
Tall grass	(3) Poor	Poor	806	18	16	51	2	9	31	31	24	27					15	12	27	23
	(1) Fair	Good	914	17	14	53	38	11	22	38	20	22					11	11	9	18
Creosotebush	(10) Poor	Poor	332	14	10	52	3	4	8	7	18	13					48	69	21	8
	(1) Fair	Fair	518	21	9	24	10	14	19	18	10	19			12	9	39	27	9	7

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a/]													
							Grass						Shrubs						Forbs	
							D		I		L		O		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Tarbush	[b/] (9) Poor	Fair	431	16	13	55	18	13	5	8	13	13			2	3	50	55	14	8
	(3) Fair	Good	402	16	11	34	40	10	15	17	20	42					19	30	6	2
Mesquite	(10) Poor	Fair	347	14	17	54	4	4	10	10	9	8	20	10	2	2	44	61	10	5
	(1) Fair	Fair	140	15	11	64	30	39			12	13					31	34	27	13
Mixed desert shrub	(9) Poor	Fair	458	18	15	47	18	11	12	13	8	11	5	10			42	45	14	9
	(1) Fair	Poor	320	11	15	48	11				10	9			1	3	65	77	13	12
Yucca	(1) Fair	Good	663	15	22	59	35	15	54	71							4		6	15
Snakeweed	(4) Poor	Fair	358	8	6	61	9	10	14	12	16	13				2	16	30	47	32
	(2) Fair	Good	794	18	16	56	41	36	23	37	6	5					20	15	10	7
Other shrubs	(1) Poor	Poor	462	14	8	71								3			100	97		
Cottonwood	(1) Poor	Poor	1,151	12	15	58						1					96	87	3	13
	Weighted Average[c/]		509																	
Shallow Sand Range Site - 042X015NTX																				
Mid grass	(5) Poor	Fair	540	20	16	57	20	30	4	4	31	34			7	3	12	16	24	10
	(5) Fair	Good	610	16	12	57	37	37	2	4	10	12			1	2	17	18	32	28
	(1) Good	Good	1,147	17	15	52	65	63	6	5	21	17					6	10	1	5
Creosotebush	(10) Poor	Fair	363	16	9	55	20	9			10	9					49	67	22	15
Tarbush	(1) Poor	Fair	253	15	11	48	12	5	30	33	6	10					48	41	4	11
Winterfat	(1) Poor	Poor	937	21	13	53	2		4		9	28			17	2	4	12	63	60
Mesquite	[c/] (10) Poor	Poor	685	17	13	56	6	7	5	2	9	12		1		1	52	58	27	19
Fourwing saltbush	(1) Poor	Fair	293	7	25	51	25	8			1	4	8	31	3	4	14	40	50	16
Mixed desert shrub	(10) Poor	Fair	460	14	14	59	5	3	8	4	12	12			2	4	40	57	35	20
Cactus	(3) Poor	Fair	533	15	10	61	18	13	3	3	16	19				1	17	27	46	37
Yucca	(3) Poor	Poor	661	25	6	57					8	14				5	6	25	83	58
White thorn	(4) Poor	Poor	413	17	10	59	6	1			3	6				3	49	54	42	36
Snakeweed	(10) Poor	Poor	573	18	15	50	9	5	1	2	18	22			2	2	42	40	26	25
	(2) Fair	Fair	443	15	10	64	17	21	5	7	33	23			4	2	25	32	16	10
	(1) Good	Good	554	13	8	42	59	26			17	12				3	10	59	12	3
Sumac	(1) Poor	Poor	102	10	11	61	2	4			4	11				7	66	79	30	
Other shrubs	(1) Poor	Poor	504	23	9	59	5	15	1	7	17	11		2			44	35	35	30
	Weighted Average		529																	
Draw Range Site - 042X016NTX																				
Annual forbs	(1) Poor	Fair	344	16	7	58	12	11	9	37	13	13					2		65	40
Short grass	(1) Poor	Poor	326	7	6	48	1		6		79	80					4	12	10	8
	(2) Fair	Fair	490	16	14	61	8	9	38	26	46	53				1	7	11		
Mid grass	(3) Poor	Poor	378	21	19	43	7	18	7	36	13	15					42	25	28	7
	(9) Fair	Fair	1,025	25	24	35	2	2	64	59	14	19					7	10	11	10
	(3) Good	Fair	1,775	33	18	41	10	6	80	76	5	8		1			1	7	1	5

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a/]													
							Grass						Shrubs						Forbs	
							D		I		L		D		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Creosotebush	[b/] (7) Poor	Fair	406	16	11	52	28	17	4	1	26	22					35	56	8	5
	(1) Fair	Fair	558	21	4	47	5	16	14	19	12	12					19	30	49	23
Tarbush	(9) Poor	Fair	884	17	10	56	13	11	27	12	9	12	1	1			47	66	5	1
	(7) Fair	Poor	781	25	12	48	4	7	56	42	13	22					18	23	9	7
	(1) Good	Fair	786	33	33	21	4	6	76	47	1	7					15	40	2	1
Mesquite	(4) Poor	Poor	988	18	22	51	3	10	4	5	6	15		2		1	68	43	19	26
	(9) Fair	Poor	606	22	22	46	3	6	47	41	14	12					31	38	5	5
	(1) Good	Fair	1,688	25	17	28	16	4	55	45		26					5	14	25	11
Mixed desert shrub	(6) Poor	Poor	350	15	20	44	3	3	27	29	20	9			5	3	35	43	8	7
	(3) Fair	Fair	715	38	26	23	5	15	45	38	11	10	12	3		1	18	29	8	4
	(2) Good	Good	617	33	30	58	32	28	36	48	2	8					12	13	20	4
Snakeweed	(3) Poor	Poor	131	4	7	63	2	6			22	20	1				25	30	47	43
	(1) Fair	Poor	147	11	6	61		12	37	23	1	3				3		25	61	32
Mormon tea	(2) Fair	Fair	1,859	34	14	40	14	6	33	22	1	4			8	6	17	32	27	28
Other shrubs	(3) Fair	Fair	1,557	27	24	37	7	2	69	56	1	3			4		19	37	1	1
	Weighted Average[c/]		775																	
Bottomland Range Site - D42X018NTX																				
Annual forbs	(8) Poor	Poor	1,321	13	18	48	5	3			17	21	11	9			17	17	51	50
Perennial forbs	(1) Poor	Poor	69	6	20	64								43			56	50	44	7
Short grass	(4) Poor	Fair	935	23	16	47	11	10	25	4	34	78			17	4	13	3	2	1
Mid grass	(10) Poor	Fair	889	21	16	43	7	6	53	53	11	21			1		12	13	14	7
	(5) Fair	Fair	1,165	22	9	59	12	6	58	57	10	17			5		1		13	21
Tall grass	(10) Poor	Good	814	20	15	42	20	31	35	16	23	18		1			10	10	16	22
	(2) Fair	Fair	142	12	17	62	10	4	60	81	2	4			2	1	5	3	22	8
Creosotebush	(2) Poor	Fair	466	15	12	60	16	13	30	22	4	7					47	59	3	
Tarbush	(5) Poor	Fair	1,196	33	16	36	6	3	24	18	8	22		1			49	42	13	13
	(1) Fair	Fair	643	25	17	52			93	58	7	16						25		
Mesquite	(10) Poor	Good	920	28	13	44	4	2	18	14	5	9	16	14	1		31	35	26	28
	(1) Fair	Fair	432	13	14	43	8		77	66	2				9	7	1	26	3	
Fourwing saltbush	(5) Poor	Good	494	12	32	79		2			3	2	55	46	1	1	16	31	24	18
Mixed desert shrub	(6) Poor	Poor	451	17	13	52	9	9	1	4	8	5			3	8	57	62	20	9
Other shrubs	(10) Poor	Poor	813	21	31	33	2	3	12	3	6	10					48	60	35	22
	(1) Fair	Fair	3,468	30	27	37	2	37	88	42	1	2					8	9		10
Desert willow	(1) Poor	Poor	240	26	27	26			13	44							84	50	4	5
	Weighted Average		875																	
Limestone Hills Range Site - D42X021NTX																				
Short grass	(1) Fair	Good	321	15	17	14	43	48	6	6	8	4		2	3	4	23	24	15	12
Mid grass	(6) Poor	Good	519	17	7	12	30	32	22	19	11	12	1	1	3	6	24	27	9	4
	(7) Fair	Good	774	25	11	3	52	42	16	13	8	11	1	2	2	6	15	25	5	2

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a/]													
							Grass						Shrubs						Forbs	
							D		I		L		O		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Creosotebush	[b/] (10) Poor	Fair	312	20	8	8	4	7	7	7	15	12	1		5	4	61	64	8	6
	(2) Fair	Fair	322	16	8	8	20	8	10	1	22	12			2		40	74	6	4
Mixed desert shrub	(9) Poor	Fair	490	17	11	13	17	14	9	10	13	20	2	2	8	4	44	45	10	4
	(5) Fair	Good	533	17	10	6	41	16	19	8	8	5			1	3	29	63	5	2
White thorn	(1) Poor	Poor	252	24	9	14	9	2		2	7	11	2	7			78	80	4	2
Sotol	(2) Fair	Good	555	18	10	5	51	37	9	16	8	8	6		6	4	15	28	8	9
Mariola	(2) Poor	Poor	360	16	8	27	9	6	1	5	5	20					80	65	5	2
	(1) Fair	Good	373	16	7	2	77	48			3				1		11	49	6	2
Ocotillo	(5) Poor	Good	665	20	10	5	21	24	15	8	8	8	6	4	2	5	37	45	9	3
	(1) Fair	Fair	813	29	5	2	24	27	7	14	1	8	2	1	2	7	55	43	6	7
Sacahuista	(2) Fair	Fair	413	18	8	10	36	28	1	4	12				1	2	36	56	18	12
Other shrubs	(1) Poor	Fair	686	18	6	17	1	14	63	25	3	8				4	16	32	14	19
	(1) Fair	Good	387	20	13	3	46	25	4	7	11	5			1	4	15	48	24	13
Juniper	(1) Poor	Fair	949	7	21	3	4	8	62	21	1	17	9		3	4	4	50	17	
Weighted Average[c/]			511																	
Clayey Range Site - 042X023NTX																				
Mid grass	(1) Poor	Poor	1,148	11	3	74		3	16	35	3	6				6	1		78	50
	(10) Fair	Fair	1,062	21	13	51	2	8	67	60	5	9			4		4	4	17	18
	(9) Good	Fair	562	25	12	48	5	6	63	58	5	14			1		9	12	15	7
Creosotebush	(4) Poor	Poor	255	14	8	52	3	11	3	10	34	17					29	53	31	10
	(1) Good	Poor	168	17	8	36	3	13	10	24	23						44	51	22	9
Mesquite	(2) Fair	Good	326	20	16	58	27	9	41	23	26						6	17	5	4
Yucca	(1) Poor	Poor	1,059	28	7	47	2	6	2	2	5	19				1	1	5	89	68
Snakeweed	(2) Poor	Poor	251	12	8	66	2	5	4	10	4	6	1		48	3	18	60	23	16
	(2) Fair	Poor	240	16	18	53	2	1	56	40	8	4	1	1		2	25	52	7	2
Weighted Average			647																	
Gravelly Sand Range Site - 042X024NTX																				
Perennial forbs	(1) Poor	Good	83	4	15	60					14	8	55	17				8	31	67
Creosotebush	(10) Poor	Poor	226	14	10	40	6	4	1	1	16	13			6	1	56	70	17	10
	(10) Fair	Fair	330	15	8	21	15	9	6	2	14	13			6	4	42	64	17	9
	(1) Good	Fair	86	6	7	35	28				25	57					42	43	4	
Tarbush	(2) Poor	Fair	145	10	13	42	6	6	10	24	48	16					24	47	11	8
	(1) Fair	Fair	542	24	20	46	4	24	6	2	5	5	6	5			75	64	4	2
Mesquite	(10) Poor	Fair	500	16	15	44	8	2			5	7	12	8			57	73	19	8
	(3) Fair	Poor	215	14	13	22	3	5	1	2	10	7				9	73	67	13	8
Mixed desert shrub	(10) Poor	Fair	614	19	14	38	10	11	5	2	11	14	1		7	4	45	53	21	15
	(9) Fair	Fair	310	12	10	39	11	7	2	1	10	9	6	4	8	7	45	59	17	14
Mountain mohogany	(1) Poor	Fair	1,423	25	15	4	29	33	1		2	2	4	11			65	52	1	
Yucca	(1) Fair	Fair	701	12	13	60	7	3	9	3	7	20			11	14	53	55	13	6

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a/]													
							Grass						Shrubs						Forbs	
							O		I		L		D		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
White thorn	[b/] (1) Poor	Poor	126	16	14	9	2	7				5			5	31	93	56		
	(1) Fair	Fair	562	13	9	20	22	6	1		13		4		6	22	50	72	1	
Sotol	(1) Poor	Good	717	18	26	1	27	12	15	6	27	20		4		6	26	48	3	4
Snakeweed	(3) Poor	Poor	165	7	6	59	1			3	7	18					25	46	65	32
Burrobush	(6) Poor	Poor	209	16	21	35	13	1			16	16		1	1	1	52	80	19	3
	(1) Fair	Fair	150	5	10	29	15	7			11	21					61	64	13	7
Mormon tea	(1) Poor	Poor	106	7	12	38					20	24			39	12	3	30	39	36
Sumac	(1) Poor	Fair	555	11	16	20	8	3			20	3			21	6	52	86		
Other shrubs	(10) Poor	Poor	263	16	12	37	2	2	9	8	14	12		2	3	5	36	56	35	17
	(5) Fair	Poor	101	11	12	36	11	3		1	14	6			2	4	58	70	16	13
	Weighted Average[c/]		341																	
Igneous Hills Range Site - 042X027NTX																				
Mid grass	(10) Poor	Fair	790	22	14	10	11	30	26	26	6	6	1	1	1	1	34	20	24	15
	(10) Fair	Good	702	27	8	6	35	42	28	26	5	5			2	1	13	13	13	12
	(3) Good	Good	779	27	18	4	55	41	15	20	5	7	1	1	1	1	15	28	7	3
Tall grass	(2) Poor	Fair	526	19	8	14	11	11	29	33	8	8			1	2	30	33	22	12
Creosotebush	(10) Poor	Fair	407	18	8	19	8	10	12	6	23	15			1	1	37	52	21	13
	(10) Fair	Good	446	17	8	14	32	22	12	8	11	19	1		1	1	27	39	16	10
Mesquite	(2) Fair	Good	989	10	10	32	53	48	2		5	18					35	32	4	2
Mixed desert shrub	(10) Poor	Fair	841	14	13	18	17	23	5	6	7	9	4	1	2	3	56	56	8	4
	(9) Fair	Good	568	20	14	5	41	36	10	4	11	12	1		2	1	28	43	7	4
Oakbrush	(1) Fair	Good	534	37	18	4	61	51					10	2		2	19	27	10	17
Mixed mountain shrub	(1) Fair	Good	1,203	32	24	6	30	28	1	2	6	5	14	7	9	9	32	45	5	3
Yucca	(2) Fair	Good	480	16	8	21	23	26	21	12	14	20		1		2	33	40	8	2
White thorn	(2) Poor	Poor	467	16	10	29	4		8	4	13	17					31	55	44	24
	(3) Fair	Fair	839	21	11	3	17	15	27	18	5	9			1	1	43	52	5	7
Sotol	(5) Fair	Good	610	30	14	4	31	34	34	37	7	8			5	1	12	17	12	6
	(1) Good	Good	796	14	18	4	48	45	20	6	7	4	5	9	2	4	10	25	8	2
Mariola	(1) Poor	Fair	210	18	10	7	14	13	3	4	23	13			5	4	54	66		
Snakeweed	(5) Poor	Fair	645	18	10	29	6	24	20	17	15	11		1	11	5	16	21	34	20
	(5) Fair	Good	483	23	12	19	56	37	9	14	4	5	3	3	1	3	24	34	6	3
Ocotillo	(1) Fair	Good	297	8	14	20	75	46			7	4			2	4	11	45	4	
Other shrubs	(1) Poor	Fair	823	18	5	16	16	34	4	4	1	7	1	9	1	8	40	28	35	9
	(2) Fair	Good	634	29	10	4	32	32	14	5	17	12	2		12	13	16	30	9	5
Pinyon-juniper	(1) Poor	Fair	1,289	30	24	2	25	31	3	4	8	2		6		2	61	52	5	
Juniper	(2) Fair	Good	502	28	15	10	45	43	11	15	3	2				1	34	34	7	5
	Weighted Average		635																	
Gravelly Loam Range Site - D42035NTX																				
Short grass	(2) Poor	Poor	296	12	12	27		2	8	10	61	69	2		1	2	13	10	15	8

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a]													
							Grass						Shrubs						Forbs	
							D		I		L		D		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Mid grass	[b] (10) Poor	Fair	702	26	16	36	10	12	50	44	12	18			1	1	10	15	15	9
	(4) Fair	Good	649	21	13	35	35	41	18	14	15	9	1	1	2	1	18	31	7	4
	(1) Good	Good	364	3	5	60	41	7	12	57	5	7					16	7	22	21
Creosotebush	(10) Poor	Poor	210	17	10	25	5	7	8	5	19	18			1	1	58	70	7	4
	(4) Fair	Good	438	13	15	23	51	20	6	13	11	17			3	7	11	38	20	8
Tarbush	(10) Poor	Fair	241	15	11	34	7	14	14	10	21	19				1	35	42	21	14
	(3) Fair	Good	288	16	12	45	45	23	5	9	13	6				1	16	47	18	11
Mesquite	(5) Poor	Fair	474	13	17	40	8	7	22	30	10	7			3	1	35	45	19	10
Mixed desert shrub	(6) Poor	Fair	538	16	13	43	9	15	8	12	21	14		1	10	6	40	47	12	6
	(3) Fair	Good	630	11	14	21	44	30	6	1	17	12			1	7	15	31	20	18
Sotol	(3) Poor	Good	702	20	15	18	39	17		1	14	8	1		2	7	24	64	18	4
Snakeweed	(10) Poor	Fair	327	17	11	34	7	9	21	20	14	15			1	2	43	46	14	10
Mormon tea	(2) Poor	Fair	763	15	22	30	8	22	32	22	9	18			29	8	6	21	15	10
Other shrubs	(2) Poor	Fair	417	21	11	28	20	23	2		14	15	2		4	7	54	52	2	4
	(2) Fair	Good	353	16	8	40	45	46	17	12	13	9			1	6	19	23	6	4
Juniper	(1) Poor	Good	220	26	20	24	30	29	20	19	10	11					18	34	20	12
	Weighted Average[c]		434																	
Salt Flats Range Site - 42X036N																				
Perennial forbs	(1) Fair	Fair	215	8	2	69			73	60	10	12						24	16	4
	(1) Good	Fair	138	9	2	69	12		48	60	2	12						24	38	4
Midgrass	(6) Poor	Fair	1,078	18	6	60	3	4	9	12	12	31	3	2	12	5	10	11	51	34
	(1) Fair	Poor	194	12	10	49			45	8	28	61		3		3		13	26	14
	(2) Good	Fair	229	19	8	54			70	39	9	38		1	13	4		1	7	18
Mesquite	(2) Poor	Fair	747	14	12	54	10	4	30	33	15	16	1	2	2	1	9	22	32	24
	(1) Fair	Fair	98	10	6	8			15	31	2	3	13	9	6	19	63	34	2	3
	(3) Good	Fair	314	14	9	46	4	3	57	30	10	21	4	5	1	5	7	14	17	21
Snakeweed	(3) Poor	Poor	217	11	6	56	1	2	2	5	8	27				3	42	27	48	34
Willow	(1) Poor	Poor	857	12	28	24			4	10							81	52	16	38
Other shrubs	(1) Poor	Fair	1,499	36	10	47	25	33	5	16		3					47	18	21	28
	Weighted Average		592																	
Malpais Range Site - D42X037N																				
Midgrass	(7) Poor	Fair	487	10	8	28	17	26	18	10	12	24	1	1	13	1	13	26	23	12
	(10) Fair	Good	822	23	11	19	52	53	14	8	5	8	2	3		1	13	17	15	8
Creosotebush	(10) Poor	Fair	356	14	7	22	8	11	10	5	12	14					49	51	20	18
	(6) Fair	Fair	344	17	12	6	37	24	2	2	20	13			2	1	33	58	5	3
Mesquite	(1) Poor	Poor	581	20	4	70	2	2			31	21				1	11	36	56	42
	(1) Fair	Good	305	14	20	49	45	44		2	10	9				2	35	35	11	8
Mixed desert shrub	(1) Poor	Fair	310	14	8	39	7	2	1	12	40	28		1	7	4	13	15	31	34
Snakeweed	(10) Poor	Fair	642	20	10	48	7	6	9	8	15	20			2	2	20	25	48	41
	Weighted Average		541																	

APPENDIX B-6 (cont'd)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a]													
							Grass						Shrubs						Forbs	
							D		I		L		D		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Western Plateau MLRA 36-WP3																				
Gravelly Range Site - 036X102N																				
Short grass	[b] (1)	Poor	Poor	692	14	9	1	3	4	11		59	77					23	18	4	3
	(1) Fair	Good	449	18	10	19	45	25		13	41	52	3			2	4	6	6	
Mid grass	(8) Poor	Good	808	15	11	13	27	34	12	12	37	39			1	1	20	12	4	2
	(6) Fair	Good	685	19	8	6	45	45	5	7	29	21	1	2	2		12	23	3	3
	(3) Good	Good	774	30	11	11	60	64	16	14	9	10			2	1	9	9	3	2
Creosotebush	(1) Poor	Fair	840	22	5	2	22	34	11	21	11	9			1	4	52	33	1	
	(1) Fair	Good	450	22	14	29	40	6		6	15	35					45	52	3	
Tarbush	(1) Fair	Good	600	19	25	6	47	23		9	28	6					23	63	2	
Mesquite	(1) Poor	Poor	783	9	6	37		4	7	20	60	32					9	20	24	28
	(1) Fair	Good	993	7	16	3	52	33	1		5	10			1		30	48	8	10
Oakbrush	(1) Poor	Good	301	22	13	11	82	75										25	18	
Snakeweed	(1) Poor	Fair	780	14	11	13	20	26		6	7	12			3		61	51	6	3
Juniper	(2) Poor	Good	345	20	26	12	60	68	6	1	18	2	4	4			6	22	6	2
	Weighted Average[c]		696																	
Hill Range Site - 036X103N																				
Mid grass	(10) Poor	Good	598	21	8	8	25	31	17	16	10	16	2	2	1	1	37	27	6	4
	(10) Fair	Good	742	21	14	5	48	45	10	14	16	12		1	1	1	18	19	7	7
	(6) Good	Good	518	22	14	8	58	72	8	3	12	10	1		1	1	16	11	2	1
Creosotebush	(3) Poor	Fair	472	14	11	11	8	7	17	13	15	23			11	1	40	50	9	5
Mixed desert shrub	(2) Poor	Fair	777	21	12	22	19	28			28	14			2	2	17	46	34	9
	(2) Fair	Good	277	13	12	19	24	39	12	6	14	17	4	3			25	34	7	4
Snakeweed	(2) Poor	Fair	730	12	12	8	32	53	2	3	16	7	1		1	4	46	31	1	
	(3) Fair	Good	500	19	11	3	50	45	10	8	10	6		1	6	4	18	37	4	1
Other shrubs	(1) Poor	Good	722	21	14	5	21	25	48	25	7	17			3	2	17	34	3	
Pinyon-juniper	(1) Poor	Poor	1,836	28	24	8	3	37	1	3	2	5	4	7	1	1	87	42	2	4
	(3) Fair	Good	468	24	23	7	49	40	2		22	3					21	54	6	1
Pinyon	(3) Poor	Good	1,343	33	16	7	17	27	24	15		1	4	7	1	1	44	41	11	12
Juniper	(3) Poor	Fair	1,159	21	16	5	16	24	3	9	5	20	3	3			71	40	2	4
	(5) Fair	Fair	844	23	16	16	28	41	5	3	16	10	1	4	1	1	47	41	1	
	(4) Good	Good	331	17	11	13	70	71	2	4	8	13			1	1	11	10	8	4
	Weighted Average		690																	
Loamy Range Site - 036X104N																				
Short grass	(1) Poor	Poor	207	20	19	36					77	94					19	5	5	2
Mid grass	(4) Poor	Poor	657	25	16	24	2	3	22	11	29	43			1	4	29	22	19	14
	(4) Fair	Good	720	21	16	16	48	48	4	4	36	42					6	4	6	1
	(2) Good	Good	551	15	15	22	62	65	8	12	9	10	1	2		1	11	10	6	1
Mesquite	(1) Fair	Good	380	7	11	15	33	23	13	13	34	47					13	9	7	6

APPENDIX B-6 (concluded)

AVERAGE PRODUCTION & PLANT COMPOSITION

Vegetative Type	Ecological Condition Class	Forage Value Class	Pounds Vegetative Production (per acre)	Percent Vegetative Cover	Percent Litter Cover	Percent Bare Ground	Percent Composition by Weight and Ground Cover[a/]													
							Grass						Shrubs						Forbs	
							O		I		L		O		I		L			
							W	C	W	C	W	C	W	C	W	C	W	C	W	C
Cactus	[b/] (1) Poor	Poor	302	22	25	32		4	14	41	17	29					66	20	3	6
	(1) Fair	Good	400	23	19	32	53	42	12	8	24	37			3		5	16	1	
Other shrubs	(1) Poor	Good	521	11	18	43	45	56	6	15	23	6	2	6			10	13	12	6
Weighted Average[c/]			561																	
Breaks Range Site - 036X105N																				
Mid grass	(6) Poor	Good	815	18	15	4	22	46	16	16	19	19	1	1	2		29	16	7	2
	(9) Fair	Good	651	27	14	9	50	60	9	6	14	13			1	1	18	18	6	2
	(1) Good	Good	608	20	8	4	52	48			26	22	3		1	9	10	25	5	2
Other shrubs	(1) Poor	Poor	466	16	9	32	3	23			43	31			21	10	3	7	31	28
	(1) Fair	Fair	369	11	12	21	31	21			33	18		3			6	54	28	3
Pinyon-juniper	(1) Fair	Good	561	10	18	29	34	57		2	4	4	4		2	2	53	40		2
Juniper	(1) Poor	Fair	717	21	24	9	18	38	13	9	12	12				2	55	41		
	(2) Fair	Good	605	18	22	16	66	43	1		2			2	5	19	24	36	3	2
	(1) Good	Good	1,727	17	12	21	56	41			1	10	11	2	5	5	22	44	2	
Weighted Average[c/]			713																	
Bottomland Range Site - 036X106N																				
Mid grass	(1) Poor	Good	120	13	18	30	50	52			3						15	29	34	21
	(1) Fair	Good	276	12	19	50	2	4	42	34	25	20		2		2	13	31	18	2
Mixed desert shrub	(1) Fair	Fair	303	23	32	31	15	8	6	2	9	6		2		2	58	70	11	14
Weighted Average			233																	
Clayey Range Site - 036X107N																				
Mid grass	(1) Fair	Good	525	19	19	26	46	56		2	48	41			4	1		1	1	1
Other shrubs	(1) Poor	Fair	1,081	22	16	28	10	54	5	10	5	19			1	2	72	14	2	4
Weighted Average			803																	
Basalt Hills Range Site - 036X108N																				
Mid grass	(3) Poor	Fair	652	35	15	8	16	34	13	13	34	23		3	3		23	21	12	6
	(8) Fair	Good	467	22	12	12	49	59	1	1	20	11					13	20	15	5
Mixed desert shrub	(1) Poor	Good	363	37	7		29	30	3	3	24	22	9	9		3	15	23	19	10
Pinyon-juniper	(1) Fair	Good	492	23	14	17	48	68			1	6	25	2		1	21	25	4	
Juniper	(1) Fair	Good	675	32	18	2	68	64			7	5	1		6	4	4	16	14	5
Weighted Average			516																	
Sandy Range Site - 036X110N																				
Mixed desert shrub	(1) Fair	Good	626	18	29	11	37	27	1	2		6			25	23	33	38	3	2

Source: BLM Las Cruces District Southern Rio Grande SVIM Data, 1980.

Notes: a/O= desirable, I= intermediate, L= least desirable plant species, W= weight, C= cover. Line totals do not always equal 100 because of rounding to whole numbers.

b/Number of Transects Included

c/Weighted average derived from the sum of number of transects X the pounds divided by the total number of transects.

APPENDIX B-7

EXAMPLE OF A POTENTIAL NATURAL PLANT COMMUNITY

The following example is the description of the potential natural plant community for a loamy range site occurring on the Western Plateau MLRA, Subresource Area WP-3.

Descriptions of other ranges occurring in the SRGPA are on file at the Las Cruces BLM Office.

The technical range site descriptions, are taken from Technical Guides prepared by the Department of Agriculture, Soil Conservation Service (Transmittal Notice No. 403 and No. 352).

LOAMY RANGE SITE (WP-3)

POTENTIAL NATURAL PLANT COMMUNITY

1. This is a grassland site which is characterized by short and mid-grasses. Blue grama is the dominant species. Also characteristic are sideoats grama, tobosa, and threeawns. Cool-season species include bottlebrush squirreltail and New Mexico feathergrass. Soaptree yucca and longleaf ephedra are noticeable "aspect" species, as is cane bluestem, which tends to occur in colonies. Forbs such as desert baileya, globemallow, and Wright buckwheat are also common to the site.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage yield.

Grasses and Grasslike - 80-90%		(Shrubs, half-shrubs, vines and trees) Woody - 5-10%		Forbs - 5-10%	
Blue grama	25-30	Soaptree yucca	1-5	Desert baileya)	
Black grama	5-10	Longleaf ephedra)		Wright buckwheat)	
Sideoats grama	10-15	Winterfat)	1-5	Paperflower)	1-5
Plains bristlegrass)	1-3	Condalia)		Globemallow)	
Halls panicum)		Wolfberry)		Threadleaf groundsel)	
Arizona cottontop)		Cacti)	1-3	Filaree)	
Cane bluestem)	5-10	Broom snakeweed)		Others	3-8
Vine-mesquite)					
Bottlebrush squirreltail	5-15				
Bush muhly	1-5				
Tobosa)	3-8				
Galleta)					
Threeawns spp.)					
Fluffgrass)					
Sand muhly)	5-10				
Ring muhly)					
Sand dropseed)					
Other grasses	1-3				

3. Canopy - The shrub and half-shrub canopy on this site averages 4 percent.

4. Ground Cover (Average Percent of Surface Area)

Grasses and forbs - plant density	25
Bare ground	49
Surface gravel	5
Surface cobble and stones	1
Litter - percent of area	20
average depth in centimeters	2

TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Average of favorable years - 1,000 pounds per acre
Average of unfavorable years - 425 pounds per acre

APPENDIX B-8

PUBLIC LAND ACRES BY VEGETATIVE SUB-TYPE AND RANGE SITE

MLRA 42 SOUTHERN DESERT SD-2

Vegetative Sub-Type Name	No.	42X010NTX Gravelly	42X011NTX Oeep Sand	42X012NTX Sandy	42X014NTX Loamy	42X015NTX Shallow Sandy	42X016NTX Oraw	42X018NTX 8ottomland	42X021NTX Limestone Hills	42X023NTX Clayey	42X024NTX Gravelly Sand	42X027NTX Igneous Hills	42X035NTX Gravelly Loam	42X036N Salt Flats	42X037N Malpais	Subtotal	Percent
Annual forbs	0999						61	3,266								3,327	.16
Perennial forbs	3001	359		1,310				224			62					1,955	.09
Short grass	1001	1,524		81	5,457		537	2,270	46				1,491			11,406	.55
Mid grass	1002	21,266	35	19,804	12,774	2,283	18,020	9,207	17,397	24,410		71,076	2,781	18,946	19,657	237,656	11.47
Tall grass	1003				1,119		121	1,057				460				2,757	.13
Creosotebush	4011	519,859	8,632	40,267	19,471	62,198	5,018	2,921	14,376	367	66,686	43,871	26,086		75,498	885,250	42.73
Tarbush	4012	3,878		1,286	15,154	63	9,959	1,681		135	242		8,540			40,938	1.98
Broom dalea	4013		4,440	675												5,115	.25
Winterfat	4015					15										15	.00
Mesquite	4021	3,503	22,741	423,441	3,210	41,012	3,532	2,760		360	3,384	352	1,082	6,082	2,324	513,783	24.80
Fourwing saltbush	4034					110		401								511	.02
Mixed desert shrub	4037	10,810	5,679	21,557	1,823	14,632	3,290	2,693	28,064		11,202	24,936	5,301		14,011	143,998	6.95
Sand sage	4046		21													21	.00
Mountain mohogany	4056										558					558	.03
Oakbrush	4058										19	230				249	.01
Mixed mountain shrub	4060											2,639				2,639	.13
Cactus	4062					1,822										1,822	.09
Yucca	4064	1,113	4,690	11,418	3,335	2,897				441	204	7,275	252		299	31,924	1.54
White thorn	4065	3,590		4,462		6,198			99		3,401	4,192				21,942	1.06
Sotol	4069								2,193		803	1,518	2,948			7,462	.36
Mariola	4070	91							1,704			179				1,974	.10
Snakeweed	4071	6,615	11	26,722	183	43,789	1,530	4		201	983	6,376	12,820	403	9,642	109,279	5.28
Willow	4074													1,058		1,058	.05
Burrobush	4076	154									1,393					1,547	.07
Mormon tea	4077		3	689			20				28		196			936	.05
Sumac	4078			1,713		518					282					2,513	.12
Ocotillo	4079	94							5,584			339				6,017	.29
Sacahuista	4080	20							1,142							1,162	.06
Other shrubs	4999	52	733	1,240	371	129	350	5,212	5,273		5,318	1,034	3,162	69		22,943	1.11
Oesert willow	5075							543			1,307					1,850	.09
Cottonwood	5085				142											142	.01
Ponderosa pine	6011											230				230	.01
Pinyon-juniper	6093	201										2,553				2,754	.13
Pinyon	6097															0	.00
Juniper	6098	196							40			2,708	107			3,051	.15
Waste		281		20				2,141			239		31			2,712	.13
Total		573,606	46,985	554,685	63,039	175,666	42,438	34,380	75,918	25,914	96,111	169,968	64,797	26,558	121,431	2,071,496	100.00
Percent by MLRA		27.69	2.27	26.78	3.04	8.48	2.05	1.66	3.66	1.25	4.64	8.21	3.13	1.28	5.86		100.00
Percent of Total		26.73	2.19	25.85	2.93	8.18	1.98	1.60	3,54	1.21	4.48	7.92	3.02	1.24	5.66	96.53	

APPENDIX B-8 (concluded)

PUBLIC LAND ACRES BY VEGETATIVE SUB-TYPE AND RANGE SITE

MLRA 36 WESTERN PLATEAU WP-3

Vegetative Sub-Type Name	No.	36X102N Gravelly	36X103N Hills	36X104N Loamy	36X105N Breaks	36X106N Bottom-land	36X107N Clayey	36X108N Basalt Hills	36X110N Sandy	Subtotal	Percent	Grand Total*	Percent
Annual forbs	0999									0	.00	3,327	.15
Perennial forbs	3001									0	.00	1,955	.09
Short grass	1001	68		47						115	.15	11,521	.54
Mid grass	1002	10,171	20,668	2,878	11,460	37	23	5,951		51,188	68.67	288,844	13.46
Tall grass	1003			47						47	.06	2,804	.13
Creosotebush	4011	1,150	270							1,420	1.90	886,670	41.32
Tarbush	4012	414								414	.56	41,352	1.93
Broom dalea	4013									0	.00	5,115	.24
Winterfat	4015									0	.00	15	.00
Mesquite	4021	315		129						444	.60	514,227	23.96
Fourwing saltbush	4034									0	.00	511	.02
Mixed desert shrub	4037		1,198					1,876	87	3,161	4.24	147,159	6.86
Sand sage	4046									0	.00	21	.00
Mountain mohogany	4056									0	.00	558	.03
Oakbrush	4058	21								21	.03	270	.01
Mixed mountain shrub	4060									0	.00	2,639	.12
Cactus	4062			183						183	.25	2,005	.09
Yucca	4064									0	.00	31,924	1.49
White thorn	4065									0	.00	21,942	1.02
Sotol	4069									0	.00	7,462	.35
Mariola	4070									0	.00	1,974	.09
Snakeweed	4071	211	1,025							1,236	1.66	110,515	5.15
Willow	4074									0	.00	1,058	.05
Burrobush	4076									0	.00	1,547	.07
Mormon tea	4077									0	.00	936	.04
Sumac	4078									0	.00	2,513	.12
Ocotillo	4079									0	.00	6,017	.28
Sacahuista	4080									0	.00	1,162	.05
Other shrubs	4999		40	66	37		99			242	.32	23,185	1.08
Desert willow	5075									0	.00	1,850	.09
Cottonwood	5085									0	.00	142	.01
Ponderosa pine	6011									0	.00	230	.01
Pinyon-juniper	6093		5,981		423			1,158		7,562	10.15	10,316	.48
Pinyon	6097		1,399							1,399	1.88	1,399	.07
Juniper	6098	1,489	2,954		743			1,920		7,106	9.53	10,157	.47
Waste										0	.00	2,712	.13
Total		13,839	33,535	3,350	12,663	37	122	10,905	87	74,538	100.00	2,146,034	100.00
Percent by MLRA		18.57	44.99	4.49	16.99	.05	.16	14.63	.12		100.00		
Percent of Total		.64	1.56	.16	.59	.00	.01	.51	.00	3.47		100.00	

Source: BLM Las Cruces District Office SVIM Data, 1980.

Notes: *Indicates total of both Southern Desert & Western Plateau MLRAs.

APPENDIX B-9

REPORTED LOCATIONS OF THREATENED, ENDANGERED AND SENSITIVE PLANTS ON PUBLIC LAND IN THE SOUTHERN RIO GRANDE PLANNING AREA

ORGAN MOUNTAIN PLANNING UNIT

PLANT	LOCATIONS	ALLOTMENT
Cerus greggii	T. 22 S., R. 3 E. Section 30 Alameda Arroyo	5013
" "	T. 26 S., R. 4 E. Section 28 Anthony Gap	5004
Corypantha sneedii sneedii	T. 26 S., R. 4 E. Section 27 Anthony Gap	5001
" " "	T. 26 S., R. 4 E. Section 33 Franklin Mountains	5004
Draba standleyi	T. 23 S., R. 2 E. Section 24 Tortugas Mountain	Unallotted
Oenothera organensis	T. 22 S., R. 4 E. Section 32 The Needles	5003
" "	T. 22 S., R. 4 E. Sections 33 and 34 SE Aguirre Spring and Rock Spring	5003
" "	T. 22 S., R. 4 E. Sections 29 and 32 Indian Hollow	5003
" "	T. 22 S., R. 3 E. Section 25 Rabbit Ears	5013
" "	T. 22 S., R. 4 E. Section 34 Texas Canyon	5003
Aletes filifolius	T. 22 S., R. 4 E. Section 18 Baylor Peak	5013 5006 5003

APPENDIX B-9 (concluded)

ORGAN MOUNTAIN PLANNING UNIT

PLANT	LOCATIONS	ALLOTMENT
Opuntia arenaria	T. 25 S., R. 3 E. Section 25 (SWA K010)	5009
" "	T. 26 S., R. 4 E. Section 19 North of O'Hare Road (J036)	5004
Talinum longipes	T. 23 S., R. 2 E. Section 24 Tortugas Mountain	Unallotted

LAS UVAS PLANNING UNIT

Cerus greggii	T. 22 S., R. 4 W. Section 31 Apache Flats	3009
" "	T. 22 S., R. 2 W. Section 23	3013
Echinocereus lloydii	T. 28 S., R. 2 W. Section 24 SE Potrillo Mountains	3020
Opuntia arenaria	T. 25 S., R. 2 E.	Unallotted
Penstemon lanceolatus	T. 20 S., R. 3 W. Peloncillo Peak	3012

CABALLO PLANNING UNIT

Cryptantha paysonii	T. 18 S., R. 6 W. Section 12 Berrenda Creek	6074
Astragalus castetteri	T. 16 S., R 4 W. Section 3 Caballo Mountains	6049
Perityle staurophylla var. homoflora	T. 16 S., R. 4 W. Section 9 Bat Cave Canyon	6049
" "	T. 16 S., R. 4 W. Section 24 Caballo Mountain	6018 6110

APPENDIX B-10

GRAZING MANAGEMENT CONSIDERATIONS FOR SOUTHERN RIO GRANDE PLANNING AREA

Precipitation Influence and Importance

In the Southern Rio Grande Planning Area, precipitation during the growing season is the single most important variable in a plant's growth process. In short, effective soil moisture is the supreme limiting factor for plant growth and development. The variability of precipitation, its amount and timing from year-to-year, is a major factor responsible for many grazing management problems. Plant response is almost totally determined upon the timing of the precipitation and subsequent soil moisture.

The major perennial grass species in the Planning Area are warm-season plants. About 90 percent of their growth is during the summer growing season of July through September and about 10 percent during late fall and early spring. Occasionally growth may begin in May or June depending on the advent of rain; but normally this period is dry and the perennial grass species are dormant. On the other hand, plant growth may be retarded or delayed until mid or late August, again depending on rainfall. Ordinarily, growth continues into October before it is stopped by frost. Visible growth often temporarily ceases during the usual 3 month growing season unless rainfall is adequate and well-timed (Paulsen and Ares 1962). Jameson (1965) reports also that the warm-season grasses experience little, if any, growth from late spring through mid-July; and that there is little difference in the effect on these plants whether grazing begins in the period of semi-dormancy or late in the period.

Paulsen and Ares (1962) reported that black grama growth is completed within a relatively short time in the summer, often within 30 days. Flower stalks ordinarily head out and mature within 5 to 7 weeks after growth starts. Hence, in most years, flowering begins early in August, the caryopses are set by late September, and seed dissemination begins in October (Nelson 1934).

Drought is a serious consideration for management on the semi-desert grass-shrub rangelands. Herbel and Gould (1973) emphasized that drought periods are frequent and expected, and that the arid rangelands are very fragile. During 53 years of record on the Jornada Experimental Range, 45 percent or 24 years were classified as drought years. Stands of perennial grasses are often severely reduced by drought. Herbel and Gould further report that any overuse of the key perennial grasses followed by a prolonged drought can result in high mortality.

Results of several studies and reviews of various range literature reports show that the impacts of weather on short-term vegetational changes is often greater than the influence of management (Martin 1973).

Norton (1981) reported that,

> "In a realistic rangeland situation in the western U.S., the influence of grazing on vegetation production is insignificant in comparison with the effect of climate on production . . ."

Paulsen and Ares (1962) reported that the basal area of perennial grasses in the fall correlated best with precipitation for the 15 month period ending September 30 of the year of measurement. Cable and Martin (1975) found in southern Arizona that herbage production in a given summer is related not only to current summer rainfall but to rainfall during the previous growing period. The fact that rainfall in two successive summers is involved in the current summer's perennial grass production means that low rainfall in one summer not only reduces production during the current summer, but it reduces the prospects for the next summer as well. They (Cable and Martin 1975) found the reason for this is that the culms that produce herbage during the current summer originated as basal buds that broke dormancy either during the preceding spring, or more commonly, the preceding fall. Consequently, a dry summer and a dry spring preceding a high-rainfall summer will result in relatively low herbage production because the number of herbage-producing culms is low (Martin 1975). Thus, it takes 2 years to produce a grass crop, and it takes at least 2 years to recover from a 1 year drought. Hence, management decisions should be made with these thoughts in mind.

Utilization

The key indicator of proper stocking is the intensity of use. Martin (1975) notes that on semidesert grass-shrubs rangelands, that the number of cattle grazed should be sufficient to utilize about 40 percent of the perennial grass herbage produced in an average year. This level of grazing will maintain good grass composition over the rangeland. Herbel (1974) points out that grazing limited to no more than 40 percent utilization of the weight of the current year's forage will provide for maintenance or improvement of the desired vegetation. Valentine (1970) suggested grazing less than 40 percent as a desirable management for improving deteriorated black grama rangeland. Paulsen and Ares (1962) found that black grama cannot maintain itself and remain in good productive condition under the impact of repeated droughts by grazing 50-55 percent. They recommended that black grama rangeland be grazed at no more than 30-35 percent use level, and that 50 percent use be applied only to good-condition rangeland.

Clipping studies (Miller 1976 and Gadzia 1979 as reflected by Donart 1980) indicated that just prior to or during seed production is a common phenological stage of growth when a single, severe removal of herbage is detrimental to plant vigor. Grazing or defoliating black grama during or after flowering was most detrimental to the plant. On the other hand, defoliation during the early vegetative growth stage (3 to 4 leaf stage) was not harmful if use was restricted to 65 percent or less (65 percent during this time only results in a 16-30 percent use of total annual production). Jameson (1965) also reported that warm-season perennial grasses should be protected from grazing during the summer growing season if they are to be favored.

Ogden (1980) summarized that the phenological stage of plant growth in combination with an opportunity for regrowth following herbage removal are major considerations in providing for the welfare of the individual plant. Trlica and Cook (1971) found that clipping Utah desert shrubs and grasses late in the growing season so that limited regrowth occurred after defoliation resulted in low carbohydrate reserved in the fall. Menke (1973) found fourwing saltbush was most sensitive to damage by severe defoliation in late summer or early fall at or near seed maturing. Hence, if close herbage removal occurs during the early reproductive stage of growth when opportunity for regrowth is limited, reduced plant vigor is the normal consequence.

Flexibility of Herd Numbers

Paulsen and Ares (1962), Herbel and Nelson (1969), and Herbel et al. (1974) emphasized that flexibility in livestock numbers is recommended to adjust to the inevitable fluctuating forage crop. Forage production is so variable in the semidesert region that the year-to-year production may vary from a few pounds to several hundred pounds. In fact, Herbel (1969) noted that a fluctuating forage crop is a fact-of-life in this area. He further states that a rangeland unit stocked at a constant level, based on average years, is to invite destruction of the rangeland resource. Herbel and Nelson (1973) recommend a flexible stocking plan whereas the base herd would be comprised of not more than 55 to 60 percent breeding animals, and the remainder of the herd would be yearlings and replacement heifers. For despite the application of the best known techniques of rangeland management, periods of low forage production often occur when stocking must be reduced (Paulsen and Ares 1962). Norton (1981) also recognizes that while stocking rates remain static, grazing pressure increases in years of low forage production. Of course under these conditions, forage utilization would approach maximum use, which would likely depress subsequent production. Conservative stocking levels set for years of average production would naturally reduce grazing pressure during years of low forage production.

APPENDIX B-10 (cont'd)

UTILIZATION CRITERIA FOR IMPORTANT FORAGE SPECIES[a/]

Removing no more than 40 percent of the weight of the current year's forage growth on perennial grass species is recommended where improved rangeland condition is desired, except as where indicated.

PLANT PHENOLOGY	LATE DORMANCY	VEGETATIVE		FLOWERING	EARLY DORMANCY
Growth Stages	January thru Sustained Green up	Early(3-4 leaf)	Late(5-6 leaf)	Early Boot Late Boot Seed Shatter	November-January
Grasses					
Black grama Bouteloua eriopoda Warm-season	Graze to desirable residue or use level - generally not more than 50-55% on good condition rangeland (leave 3" stubble height). Graze only 30-35% of total annual forage production on deteriorated rangeland (leave a 4" stubble height).	Grazing during 3-4 leaf stage is not detrimental to plant as later in the growing season. By grazing only up through this stage allows the plant ample regrowth time to complete its physiological needs. Early use of the species has less impact on plant vigor than late season or continuous defoliation. Defoliation at 65% use during this period removes only 30% of total plant production for year. However, this degree of use significantly reduces the number of stolons produced during the previous growing season, but does not remove following year's stolon production. Black grama is not highly preferred by cattle during the summer growing season when other more palatable species are available. On ranges below 5,000 feet, black grama may not comprise 10% of the diet during the summer except under droughty conditions or unfavorable rangeland conditions.	Rest whenever possible	Rest----------resting throughout the growing season, especially during and after flowering, is critically important to the improvement of black grama. Defoliation during this period of growth is most detrimental to plant vigor and vegetative reproduction potential. Plants clipped during or after flowering or continuously through the growing season produced less herbage the following year than plants defoliated during the vegetative growth stage. Herbage production is highly variable from year to year. Current year's herbage is dependent on effective precipitation from July-September and also on the previous growing seasons rainfall and production. When the species is properly managed, associated plants will grow well. Thus grazing no more than 40% of current year's herbage production by weight; deferring from grazing during the growing season; and given consideration to drought stress and the fact that it takes at least 2 years to recover from a 1-year drought are management strategies that will contribute to improving the stand. Ninety percent of its growth is produced during the rainy season (July-August-September). Reproduction is almost entirely by stolons and tillering. Minimal viable seed is produced, and unfavorable climatic conditions inhibit germination. Canfield (1939) noted that the period of growth varied from 64 to 176 days, but approximated 98 days in most years. Physiologically, most height growth is completed within a relatively short time in the summer, often within 30 days. Flower stalks ordinarily head out and mature within 5 to 7 weeks after growth starts. In most years, flowering begins early in August, the caryopses are set by late September, and seed dissemination begins in October.	Grazing 30% of total annual production at this time is a highly desirable management practice for improving deteriorated black grama rangeland (leave about 4" stubble height). Use during this period and on through late dormancy allows utilization of the plant when it is least susceptible to grazing injury. The plant is highly nutritious at all seasons of the year; growth activity of plants in winter increases its palatability. Black grama may comprise as high as 62% of cattle diet during this time.
Sideoats grama Bouteloua curtipendula Warm-season	Graze or utilization up to 50% of total annual production of plant.	Rest--Rest Resting during the growing season (July, August, September) is critical for replenishing root reserves and providing for new root growth. The plant is highly palatable and nutritious. Greens up somewhat earlier in the spring than other gramas.			Use from early through late dormancy is a preferred management strategy if improvement of the species is desired
Blue grama Bouteloua gracilis Warm-season	Graze or utilization up to 50% of total annual forage production of plant.	Rest--Rest Rest during the growing season, mainly July and August, depending on effective soil moisture or precipitation timing. Highly palatable to all livestock. It is a fast summer-growing species and matures in about 60-70 days after summer rains start. Produces abundant forage under favorable conditions.			Graze through late dormancy.
Mesa dropseed Sporobolus flexuosus Warm-season	Graze - Moderate use of 40-50% is desirable.	Grazing 60% up to or during this time, which will remove about 20% of the total annual forage production, allows recovery of plants before growing season ends. Grazing is less detrimental to the plant at this time than later in the growing season. Can withstand heavier use prior to flowering than during the remainder of the growing season		Rest------------------------------------ Defoliation during flowering or continuously throughout the growing season significantly reduces production the following growing season. However, the species is very opportunistic related to effective soil moisture thereby responding rapidly to favorable conditions. (Likely if adequate growth and moisture conditions are present, it probably cannot seriously hurt the plant.) Therefore, the plant should be used when favorable climatic and growth conditions are present. It is a prolific seed producer. Best used for beef production during the growing season as plant becomes unpalatable and low in nutrients at maturity.	Graze - Moderate use of 40-50% is desirable.

APPENDIX B-10 (concluded)

PLANT PHENOLOGY	LATE DORMANCY January thru Sustained Green up	VEGETATIVE		FLOWERING			EARLY DORMANCY
Growth Stages		Early(3-4 leaf)	Late(5-6 leaf)	Early Boot	Late Boot	Seed Shatter	November-January
(Grasses con't.)							
Bush muhly *Muhlenbergia porteri* Warm-season	Graze at moderate rate of 40-50% available forage.	Rest--Rest ...or if grazed during this growth period, defoliation prior to flowering is superior to continuous or late defoliation for maintaining plant vigor. Graze no more than 35% of total annual production at this time. Grazing during the growing season is more likely beneficial for beef production, as the plant decreases in palatability and nutrition when it matures.					**Graze at 35-40% is allowable.**
Tobosa *Hilaria mutica* Warm-season	Rest or graze lightly, as mature plants are rank, coarse, and unpalatable. Grazing to 50-55% during dormancy not harmful to species, overutilization would occur on other favored management species.	Graze---Graze The species is best used during the summer growing season while the plant is most palatable. (Period of active growth is similar to black grama.) Utilization of 40-55% is desirable to maintain a vigorous stand. Tobosa pastures can be used to round out required rest on other favored management species.					**Rest or graze, but mature plants are rank, coarse, and unpalatable, so best use will be made when grazed during periods of active growth.**
Alkali sacaton *Sporobolus airoides* Warm-season	Graze or rest.	Graze---Graze Best used during summer growing season when palatability and nutrition of plant is at highest level. However, if improvement of stand is desired, periodic summer growing season rest is required.					**Plant can withstand 60-65% use during dormancy. The species matures coarse and rank, but cattle are found to do well anyway.**
Shrubs							
Fourwing saltbush *Atriplex canescens* Cool-season	Graze - species best used during dormant period.	Rest or very light use[b]			Most sensitive to defoliation in late summer or early fall at or near seed maturity. Grazing should be held to about 40% use of total annual forage production.		**The species is best grazed during the dormancy periods. Palatability and nutrition remain high during non-growth period.**
Winterfat *Ceratoides lanata* Cool-season	Graze - species best used during dormancy.	Rest or very light use[b]		Cannot tolerate overuse during the growth period, especially during flowering.	Graze no more than 35% of total annual forage production to maintain vigor and production. Most desirable management is to rest in the late growing season if moisture is available.		**Grazing during dormancy is preferred management when possible. Can be grazed heavier during dormancy.**
Mountain mahogany *Cercocarpus montanus* Cool-season	Graze	Rest or light use[b]		Rest or light use			**Can withstand heavy use during dormancy, however should not consistently be grazed at heavy intensity.**
Desert ceanothus *Ceanothus greggii* Cool-season	Graze	Rest or light use[b]		Rest or light use			**Graze - utilization should be no more than 40%.**

Source: Donart, 1980; Martin, 1975; Herbel, Steger, and Gould 1974; Valentine, 1970; Paulsen and Ares, 1962; Miller and Donart, 1979; Cable and Martin, 1975; and Miller, 1976.

Notes: a/To be used as a guide only in establishing rangeland grazing practices--is not a grazing system. Desert rangeland plants respond, physiologically, more to precipitation timing and subsequent effective soil moisture than to any calendar month or date. Therefore, management of any forage species must be flexible enough to allow for such variation of year to year precipitation patterns. Thus grazing systems or treatments following a set calendar schedule in the Planning Area will meet with little or no success.

b/Vegetative leaf stages (3-4 and 5-6) not applicable.

APPENDIX B-11

Phenology of Important Forage Species in Southern Rio Grande Planning Area

Plant Species	Phenological Growth Stages[a/]				Reproduction		
	Vegetative	Flowering	Seed Ripe	Seed Dissemination	Seed	Rhizomes	Stolons
Grasses							
Black grama	6/15-8/1	8/1-9/20	9/5-10/15	10/1-11/15	X		X
Blue grama	7/10-8/30	7/20-9/20	8/20-10/20	9/5-11/5	X	X	
Sideoats grama	7/10-9/15	7/15-9/30	8/15-10/30	9/1-11/15	X	X	
Mesa dropseed	7/1-8/10	8/5-9/20	9/5-9/30	10/10	X		
Bush mushly	7/10-9/15	8/15-10/15	9/1-11/15	9/20-11/30	X		
Tobosa	7/10-8/10	8/5-9/20	9/5-9/30	10/10	X	X	
Alkali sacaton	7/1-9/15	8/1-10/15	9/1-11/15	9/15-11/30	X		
Shrubs							
Fourwing saltbush[b/]	3/1-6/15	5/15-8/15	9/15-11/1	10/1-12/15	X		
Winterfat	3/15-4/15	4/15-5/30	9/15-10/30	10/1-11/30	X		
Mountain mahogany	3/1-4/15	4/15-5/30	9/1-10/30	10/1-11/30	X		
Desert ceanothus	No data						

Source: Miller, 1976.

Notes: a/Phenology of desert rangeland plants is more related to precipitation timing and subsequent effective soil moisture than are calendar dates.

Dates are approximate ranges and are not fixed or absolute and should be used only as general guides.

b/In studies conducted by Richard Frank Miller in 1974-1976 on NMSU Agriculture Experiment Station Ranch North of Las Cruces, New Mexico, Atriplex canescens initiated vegetative growth during May in each of the three years of study. Flowering began in July and generally matured in late August and early September.

APPENDIX B-12

Dates of Phenological Stages and Range of Their[a] Occurrence for Bush Muhly

PHENOLOGY	DATES 1974	1975	1976	RANGE (Days)
VEGETATIVE	7/16	7/28	7/20	12
FLOWERING	8/14	9/17	9/12	34
SENESCENCE	11/20	10/22	9/29	52
QUIESCENCE	12/15	11/6	10/12	63

Source: Donart, 1980.

Notes: [a] Plant response studies conducted on New Mexico State University Experimental Ranch, north of Las Cruces.

APPENDIX C
SOILS

APPENDIX C-1

SERIES AND CLASSIFICATION OF SOILS IN THE PLANNING AREA

Soil Series	Classification
Aftaden	Loamy, mixed, thermic Lithic Haplargids
Akela	Loamy-skeletal, mixed (calcareous), thermic Lithic Torriorthent
Aladdin	Coarse-loamy, mixed, thermic Torriorthentic Haplustolls
Arizo	Sandy-skeletal, mixed, thermic Typic Torriorthent
Berino	Fine-loamy, mixed, thermic Typic Haplargid
Bluepoint	Mixed, thermic Typic Torripsamment
Bucklebar	Fine-loamy, mixed, thermic Typic Haplargid
Cacique	Fine-loamy, mixed, thermic Petrocalcic Paleargid
Caliza	Sandy-skeletal, mixed, thermic Typic Calciorthid
Canutio	Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthent
Casito	Loamy-skeletal, mixed, thermic, shallow Petrocalcic Ustollic Paleargid
Cave	Loamy, mixed, thermic, shallow Typic Paleorthid
Chamberino	Loamy skeletal, mixed, thermic Typic Calciorthid
Continental	Fine, mixed thermic Typic Haplargid
Coxwell	Loamy-skeletal, mixed, thermic Ustollic Haplargid
Cruces	Loamy, mixed, thermic, shallow Petrocalcic Paleargid
Dalby	Fine, montmorillonitic, thermic Typic Torrert
Deama	Loamy-skeletal, carbonatic, mesic Lithic Calciustoll
Delnorte	Loamy-skeletal, mixed, thermic, shallow Typic Paleorthid
Dona Ana	Fine-loamy, mixed, thermic Typic Haplargid
Eba	Clayey-skeletal, mixed, thermic Typic Haplargid
Elbutte	Clayey, mixed (calcareous), thermic, shallow Typic Torriorthent
Gila	Coarse-loamy, mixed (calcareous), thermic Typic Torrifluvent
Glendale	Fine-silty, mixed (calcareous), thermic Typic Torrifluvent
Goldust	Clayey-skeletal, mixed, mesic Aridic Argiustoll
Hap	Fine-loamy, mixed, thermic Typic Haplargid
Harrisburg	Coarse-loamy, mixed, thermic Typic Paleorthid
Hondale	Fine, mixed, thermic Typic Natrargid
Ildefonso	Loamy-skeletal, mixed, mesic Ustollic Calciorthid
La Fonda	Fine-loamy, mixed, mesic Ustollic Camborthid
Largo	Fine-silty, mixed (calcareous), thermic Typic Torriorthent
Latom	Loamy, mixed (calcareous), thermic Lithic Ustic Torriorthent
Lehmans	Clayey, montmorillonitic, thermic Lithic Haplargid
Lozier	Loamy-skeletal, carbonatic, thermic Lithic Calciorthid
Luzena	Clayey, montmorillonitic, mesic Lithic Argiustoll
Manzano	Fine-loamy, mixed, mesic, Cumulic Haplustoll
Marcial	Fine, illitic, thermic Typic Camborthid
Masonfort	Loamy, mixed, thermic, shallow Typic Calciorthid
Mimbres	Fine-silty, mixed, thermic Typic Camborthid
Minlith	Sandy-skeletal, mixed, thermic Lithic Torriorthent
Mohave	Fine-loamy, mixed, thermic Typic Haplargid
Motoqua	Loamy-skeletal, mixed, mesic Lithic Argiustoll
Nickel	Loamy-skeletal, mixed, thermic Typic Calciorthid

APPENDIX C-1 (concluded)

Soil Series	Classification
Nolam	Loamy-skeletal, mixed, thermic Ustollic Haplargid
Onite	Coarse-loamy, mixed, thermic Typic Haplargid
Pajarito	Coarse-loamy, mixed, thermic Typic Camborthid
Pinaleno	Loamy-skeletal, mixed, thermic Typic Haplargid
Pintura	Mixed, thermic Typic Torripsamment
Reakor	Fine-silty, mixed, thermic Typic Calciorthid
Scholle	Fine-loamy, mixed, mesic Ustollic Haplargid
Simona	Loamy, mixed, thermic, shallow Typic Paleorthid
Sotim	Fine-loamy, mixed, thermic Typic Calciorthid
Stellar	Fine, mixed, thermic Ustollic Haplargid
Tencee	Loamy-skeletal, carbonatic, thermic, shallow Typic Paleorthid
Terino	Loamy-skeletal, mixed, thermic, shallow Petrocalcic Ustollic Paleargi
Tres Hermanos	Fine-loamy, mixed, thermic Typic Haplargid
Upton	Loamy, carbonatic, thermic, shallow Typic Paleorthid
Verhalen	Fine, montmorillonitic, thermic Mollic Torrert
Wink	Coarse-loamy, mixed, thermic Typic Calciorthid
Yturbide	Mixed, thermic Typic Torripsamment

Source: Soil Conservation Service, Soil Surveys of Dona Ana, Luna, and Sierra County Areas.

APPENDIX C-2

Physical and Chemical Parameters for Soil Series

Column e - abbreviated textures are:

C = clay
L = loam(y)
S = sand(y)
SI = silt(y)
FS = fine sand(y)
GR = gravelly
COB = cobbly
ST = stony
VGR = very gravelly
VST = very stony
EXGR = extremely gravelly

Example - VGRFSL = very gravelly fine sandy loam

Column g:

Permeability refers to the rate at which water moves downward through the soil expressed in inches per hour.

Column h:

Available water capacity refers to the ability of the soil to hold water and make it available to plants expressed as inches of water per inch of soil.

NA = not available

Source: Soil Survey of Dona Ana County, New Mexico (1980); Soil Survey of Luna County, New Mexico (1980); Draft Soil Survey of Sierra County (unpublished) USDA, Soil Conservation Service.

APPENDIX C-2
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

RANGE SITE

Column (a)	(b)	(c)	(d)	(e)			(f)	(g)	(h)	(i)	(j)	(k)
Soil Mapping Unit and MLRA (Southern Desert - SD Western Plateau - WP)	Major Mapping Unit Components	Approximate % of Unit	% Slope Range	Soil Textures in Typical Pedon Range and Depth (Inches)			Coarse Fragments (% 3 inches)	Permeability (In./Hr.)	Available Water Capacity (In./Hr.)	pH Range	Wind Erodibility Group (WEG)	Water Erosion Hazard
				Surface	Subsoil	Substratum						
HILLS												
Rock outcrop - Lozier association (SD)	Rock outcrop	45	10-75									
	Lozier	30	10-50	0-6 STL	6-11 VSTL	11 Limestone Bedrock	5-70	0.6-2.0	.05-.10	7.9-8.4	8	moderate
	Other soils and landforms	25										
Motoqua - Rock outcrop association (SD)	Motoqua	40	3-60	0-2 COBL	2-20 COBSIL	20 Basalt Bedrock	25-45	0.6-2.0	.08-.11	6.6-7.5	8	moderate
	Rock outcrop	30	20-75									
	Other soils and landforms	30										
Latom - Rock outcrop association (SD)	Latom	35	15-55	0-2 STVFSL	2-10 GRL	10 Sandstone Bedrock	0-25	0.6-2.0	.10-.15	7.9-8.4	8	moderate
	Rock outcrop	30	15-55									
	Other soils and landforms	35										
Rock outcrop - Argids association (SD)	Rock outcrop	40	15-99									
	Argids	50	15-80									
	Other soils and landforms	10										
Rock outcrop - Orthents association (SD)	Rock outcrop	40	25-150									
	Orthents	35	25-75									
	Other soils and landforms	25										
Lehmans extremely rocky loam (SD)	Lehmans	50	10-25	0-4 COBL	4-13 COBC 13-18 COBSCL	18 Acid Igneous Bedrock	10-65	.06-2.0	.08-.13	7.4-7.8	-	moderate
	Rock outcrop	40	10-25									
	Other soils and landforms	10										
Rock outcrop - Luzena association (WP)	Rock outcrop	45	30-100									
	Luzena	30	30-100	0-3 STL	3-13 STCL	13 Acid Igneous Bedrock	0-25	.06-2.0	.10-.14	6.1-7.8	-	moderate
	Other soils and landforms	25										
Rock outcrop - Oeama association (WP)	Rock outcrop	40	30-95									
	Deama	30	30-50	0-4 STL	4-13 STL	13 Limestone Bedrock	5-50	0.6-2.0	.10-.12	7.4-8.4	8	moderate
	Other soils and landforms	30										
GRAVELLY LOAM												
Aladdin - Coxwell association (SD)	Aladdin	45	2-10	0-46 GRSL		46-60 GRSL	0-5	2.0-6.0	.07-.17	6.6-7.8	5	slight
	Coxwell	30	5-15	0-3 GRSL	3-33 GRCL, VGRSCL, EXGRSCL	33 Weathered Granitic Bedrock	0-15	.2-2.0	.07-.12	6.6-7.8	3	moderate
	Other soils and landforms	25										
Pinaleno - Nolam association (SD)	Pinaleno	45	1-10	0-2 VGRSL	2-20 VGRSL	20-60 VGRLS	0-20	0.2-6.0	.03-.09	6.6-8.4	-	moderate
	Nolam	35	2-10	0-2 VGFSL	2-17 VGRSCL	17-60 VGRLS	0-5	0.6-6.0	.04-.08	7.4-8.4	8	moderate
	Other soils and landforms	20										
Dona Ana - Tres Hermanas association (SD)	Dona Ana	50	0-9	0-3 VFSL	3-18 SCL	18-60 SCL, L	0	0.6-6.0	.10-.17	7.4-8.4	3	moderate
	Tres Hermanas	30	0-9	0-3 GRFSL	3-26 GRSCL	26-60 VGRSCL	0-15	0.2-6.0	.04-.17	7.4-8.4	5	moderate
	Other soils and landforms	20										

APPENDIX C-2 (cont'd)
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

Column (a) Soil Mapping Unit and MLRA (Southern Desert - SD Western Plateau - WP)	(b) Major Mapping Unit Components	(c) Approximate % of Unit	(d) % Slope Range	(e) Soil Textures in Typical Pedon Range and Depth (Inches)			(f) Coarse Fragments (% 3 inches)	(g) Permeability (In./Hr.)	(h) Available Water Capacity (In./Hr.)	(i) pH Range	(j) Wind Erodibility Group (WEG)	(k) Water Erosion Hazard
				Surface	Subsoil	Substratum						
RANGE SITE												
Elbutte - Latom complex (SD)	Elbutte	40	1-15	0-3 GRCL	3-10 CL	10 Shale Bedrock	NA	NA	NA	NA	NA	NA
	Latom	30	1-15	0-2 GRFSL	2-8 GRSCL	8 Sandstone Bedrock	0-25	2.0-6.0	.06-.15	7.9-8.4	8	moderate
	Other soils and landforms	30										
GRAVELLY												
Nickel very gravelly fine sandy loam (SD)	Nickel	60	10-75	0-3 VGRFSL	3-9 VGRFSL	9-60 VGRSL	0-10	0.2-6.0	.04-.09	7.9-8.4	-	high
	Other soils and landforms	40										
Nickel - Badland complex (SD)	Nickel	45	10-75	0-2 VGRSL		2-60 VGRSL	0-10	0.2-6.0	.04-.09	7.9-8.4	-	severe
	Badland	30	20-100									
	Other soils and landforms	25										
Nickel and Chamberino soils (SD)	Nickel	35	1-15	0-4 VGRFSL	4-12 VGRL	12-60 VGRSL	0-10	0.2-6.0	.04-.15	7.9-8.4	-	moderate
	Chamberino	35	1-5	0-7 GRL	7-17 VGRL	17-60 VGRSL	5-40	.06-6.0	.04-.10	7.9-8.4	8	moderate
	Other soils and landforms	30										
Nickel - Upton association (SD)	Nickel	50	10-15	0-5 VGRFSL		5-60 VGRSL	0-10	0.2-6.0	.04-.09	7.9-8.4	-	moderate
	Upton	25	5-10	0-8 GRSL	8-16 GRSL	16-60 Indurated Caliche	0-5	0.6-2.0	.08-.14	7.9-8.4	-	moderate
	Other soils and landforms	25										
Nickel - Tencee - Del Norte complex (SD)	Nickel	35	1-15	0-2 VGRFSL	2-13 VGRL	13-60 VGRSL	0-10	0.6-6.0	.04-.15	7.9-8.4	-	moderate
	Tencee	20	1-15	0-3 VGRL	3-12 VGRL	9 Cemented Caliche	0-25	0.6-2.0	.05-.14	7.9-8.4	-	moderate
	Del Norte	20	1-15	0-2 VGRFSL	2-12 VGRL	12 Cemented Caliche	0-15	0.6-2.0	.06-.12	7.9-8.4	8	moderate
	Other soils and landforms	25										
Mansonfort - Nickel complex (SD)	Masonfort	40	3-15	0-3 SL	3-18 GRSL	18 Fractured Andesite Bedrock	0-10	2.0-6.0	.07-.13	7.9-8.4	3	moderate
	Nickel	30	3-15	0-8 GRSL	B-60 VGRSL		0-10	0.2-6.0	.04-.09	7.9-8.4	-	moderate
	Other soils and landforms	30										
Del Norte - Cave - Tencee Complex (SD)	Del Norte	30	3-15	0-10 VGRFSL	10-14 VGRL	14 Indurated Caliche	0-15	0.6-2.0	.06-.12	7.9-8.4	-	moderate
	Cave	30	1-9	0-4 VGRFSL	4-12 GRL	12 Indurated Caliche	0-5	0.6-2.0	.07-.12	7.9-8.4	4L	moderate
	Tencee	20	1-9	0-2 VGRFSL	2-16 VGRL	16 Indurated Caliche	0-25	0.6-2.0	.05-.14	7.9-8.4	-	moderate
	Other soils and landforms	20										
Tencee - Upton association (SD)	Tencee	35	3-15	0-7 VGSL		7 Indurated Caliche	0-25	0.6-2.0	.05-.10	7.9-8.4	-	slight
	Upton	20	3-15	0-8 GRSL	8-16 GRSL		0-2	0.6-2.0	.08-.14	7.9-8.4	-	slight
	Other soils and landforms	45										

APPENDIX C-2 (cont'd)
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

Column (a)	(b)	(c)	(d)	(e)			(f)	(g)	(h)	(i)	(j)	(k)
Soil Mapping Unit and MLRA (Southern Desert - SD Western Plateau - WP)	Major Mapping Unit Components	Approximate % of Unit	% Slope Range	Soil Textures in Typical Pedon Range and Depth (Inches) Surface	Subsoil	Substratum	Coarse Fragments (% 3 inches)	Permeability (In./Hr.)	Available Water Capacity (In./Hr.)	pH Range	Wind Erodibility Group (WEG)	Water Erosion Hazard
RANGE SITE												
Tres Hermanos gravelly fine sandy loam (SD)	Tres Hermanos	50	1-9	0-2 GRFSL	2-12 GRSCL	12-60 VGRSL	0-15	0.2-6.0	.04-.17	7.4-8.4	5	moderate
	Other soils and landforms	50										
Tres Hermanos - Hap association (SD)	Tres Hermanos	65	1-10	0-3 GRL	3-16 GRCL	16-60 VGRSL	0-15	0.2-6.0	.04-.17	7.4-8.4	5	moderate
	Hap	20	1-7	0-3 GRL	3-21 VGRCL	21-60 VGRSCL						
	Other soils and landforms	15										
Eba very gravelly loam (SD)	Eba very gravelly loam	50	1-7	0-3 VGRL	3-21 VGRCL	21-60 VGRCL	5-15	0.2-2.0	.07-.09	7.4-8.4	7	moderate
	Eba gravelly fine sandy loam	20	3-15									
	Other soils and landforms	30										
Terino - Casito association (SD)	Terino	40	1-8	0-2 VGRSL	2-15 VGRSL	15 Indurated Caliche	0-5	0.2-6.0	.03-.10	7.4-8.4	8	slight
	Casito	30	1-8	0-2 VRGSL	2-12 VGRSL	12 Indurated Caliche	0-5	0.6-6.0	.03-.07	7.4-8.4	3	slight
	Pinaleno	20	1-10	0-2 VGRSL	2-30 VGRSCL	30-60 GRSL	0-20	0.2-6.0	.03-.09	6.6-8.4	-	slight
	Other soils and landforms	10										
Scholle - Ildefonso association (WP)	Scholle	35	1-15	0-5 VGRL	5-33 VGRCL	33-60 GRCL	0	0.6-2.0	.13-.18	6.6-8.4	7	moderate
	Ildefonso	30	1-15	0-4 GRL	4-14 GRL	14-60 VGRL	0-25	0.6-6.0	.06-.15	7.4-8.4	5	moderate
	Other soils and landforms	35										
GRAVELLY SAND												
Caliza - Bluepoint - Yturbide complex (SD)	Caliza	30	15-40	0-7 VGRSL	7-12 VGRSL	12-60 VGRLS	0	2.0-20.0	.03-.07	7.9-8.4	8	severe
	Bluepoint	30	1-15	0-60 LS			0	6.0-20.0	.06-.10	7.9-9.0	2	moderate
	Yturbide	25	3-30	0-15 LS	15-26 GRLS	26-60 GRS	0	2.0-20.0	.04-.08	7.4-8.4	2	severe
	Other soils and landforms	15										
Canutio - Pajarito association (SD)	Canutio	45	1-15	0-4 VGRSL		4-60 VGRLS	5-50	2.0-6.0	.04-.10	7.9-8.4	-	high
	Pajarito	35	1-9	0-4 GRSL	4-18 L	18-60 GRL	0	2.0-6.0	.09-.15	7.4-8.4	5	moderate
	Other soils and landforms	20										
DEEP SAND												
Bluepoint complex (SD)	Bluepoint	70	1-15	0-8 LFS		8-60 FS	0	6.0-20.0	.06-.10	7.9-9.0	2	slight
	Other soils and landforms	30										
Duneland - Pintura complex (SD)	Duneland	55	1-30	0-60 LFS			0	20.0	.04-.06	7.4-7.8		slight
	Pintura	30	0-5	0-2 LS		2-60 FS	0	6.0-20.0	.05-.08	7.4-8.4	2	slight
	Other soils and landforms	15										
SANDY												
Onite - Pintura complex (SD)	Onite	50	1-5	0-5 LFS	5-20 SL	20-60 SL	0	2.0-20.0	.06-.12	7.4-8.4	2	moderate
	Pintura	25	0-5	0-6 LFS		6-60 FS	0	6.0-20.0	.05-.08	7.4-8.4	2	slight
	Other soils and landforms	25										

APPENDIX C-2 (cont'd)
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

RANGE SITE

Column (a)	(b)	(c)	(d)	(e)			(f)	(g)	(h)	(i)	(j)	(k)
Soil Mapping Unit and MLRA (Southern Desert - SO Western Plateau - WP)	Major Mapping Unit Components	Approximate % of Unit	% Slope Range	Soil Textures in Typical Pedon Range and Depth (Inches)			Coarse Fragments (% 3 inches)	Permeability (In./Hr.)	Available Water Capacity (In./Hr.)	pH Range	Wind Erodibility Group (WEG)	Water Erosion Hazard
				Surface	Subsoil	Substratum						
Wink - Pintura complex (SO)	Wink	45	1-3	0-10 LFS	10-20 SL	20-60 LFS	0	2.0-6.0	.00-.15	7.9-8.4	3	slight
	Pintura	35	1-5	0-60 FS			0	6.0-20.0	.05-.08	7.4-8.4	2	slight
	Other soils and landforms	20										
Berino - Pintura complex (SO)	Berino	50	1-5	0-8 FSL	8-28 SCL	28-60 SL	0	0.6-6.0	.10-.17	6.6-8.4	3	moderate
	Pintura	25	1-5	0-60 LFS			0	6.0-20.0	.05-.08	7.9-8.4	2	slight
	Other soils and landforms	25										
Pajarito - Pintura complex (SO)	Pajarito	45	0-3	0-14 LFS	14-28 FSL	28-60 LVFS	0	2.0-6.0	.09-.15	7.4-8.4	2	moderate
	Pintura	35	0-5	0-10 LFS		10-60 FS	0	6.0-20.0	.05-.08	7.4-8.4	2	slight
	Other soils and landforms	20										
Pintura - Simona complex, eroded (SO)	Pintura	50	0-5	0-60 FS			0	6.0-20.0	.04-.06	7.9-8.4	2	slight
	Simona	30	0-5	0-6 LS	6-18 SL	18 Indurated Caliche	0-10	2.0-20.0	.06-.13	7.4-7.8	2	slight
	Other soils and landforms	20										
Berino - Bucklebar association (SO)	Berino	35	1-5	0-4 LFS	4-35 SCL	35-60 SCL	0	0.6-6.0	.09-.17	6.6-8.4	2	moderate
	Bucklebar	25	1-5	0-2 SL	2-25 SCL	25-60 L	0-5	0.6-6.0	.08-.18	7.4-8.4	3	moderate
	Dona Ana	25	1-5	0-5 FSL	5-22 SCL	22-60 SCL	0	0.6-6.0	.10-.17	7.4-8.4	3	moderate
	Other soils and landforms	15										
Berino and Mohave soils (SO)	Berino	65	0-3	0-5 LS	5-40 SCL	40-60 LS	0	0.6-6.0	.06-.17	7.4-8.4	2	moderate
	Mohave	30	0-3	0-8 SL	8-521 SCL	52-60 CL	0	0.6-6.0	.13-.19	6.6-8.4	2	moderate
	Other soils and landforms	5										
Dona Ana complex, hummocky (SO)	Dona Ana loamy fine sand	35	1-5	0-12 LFS	12-30 SCL	30-60 SCL	0	0.6-6.0	.10-.17	7.4-8.4	2	slight
	Dona Ana fine sandy loam	30	1-5	0-6 FSL	6-22 SCL	22-60 L, FSL	0	0.6-6.0	.10-.17	7.4-8.4	2	moderate
	Other soils and landforms	35										
Onite - Pajarito association (SO)	Onite	40	1-5	0-5 LS	5-18 SL	18-60 LS	0	2.0-20.0	.06-.12	7.4-8.4	2	moderate
	Pajarito	30	0-5	0-8 FSL	8-25 FSL	25-60 FSL LFS	0	2.0-6.0	.13-.15	7.4-8.4	3	moderate
	Pintura	15	0-5	0-8 FS		8-60 FS	0	6.0-20.0	.05-.08	7.4-8.4	2	slight
	Other soils and landforms	15										
Wink - Harrisburg association (SO)	Wink	35	1-3	0-2 FSL	2-26 FSL	26-60 SL	0-5	2.0-6.0	0.0-.15	7.9-8.4	3	moderate
	Harrisburg	25	1-5	0-4 LFS	4-24 FSL	24 Caliche	0	2.0-6.0	.08-.15	7.4-8.4	2	slight
	Simona	20	1-5	0-2 SL	2-7 SL	7 Caliche	0	2.0-6.0	.09-.15	7.4-8.4	3	slight
	Other soils and landforms	20										
Cruces - Cacique complex, hummocky (SO)	Cruces	45	1-5		0-18 SCL	18 Indurated Caliche	0	0.6-20.0	.05-.16	6.6-8.4	2	moderate
	Cacique	25	1-5	0-2 FSL	2-24 SCL	24 Indurated Caliche	0	0.6-20.0	.05-.16	6.6-8.4	2	moderate
	Other soils and landforms	30										
Wink - Dona Ana association (SO)	Wink	55	1-5	0-2 LFS	2-20 FSL	20-60 GRSL	0-5	2.0-6.0	0-.15	7.9-8.4	2	moderate
	Dona Ana	25	1-5	0-3 FSL	3-17 SCL	17-60 SL	0	0.6-6.0	.10-.17	7.4-8.4	2	moderate
	Other soils and landforms	20										

APPENDIX C-2 (cont'd)
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

RANGE SITE

Column (a)	(b)	(c)	(d)	(e)			(f)	(g)	(h)	(i)	(j)	(k)
Soil Mapping Unit and MLRA (Southern Desert - SD Western Plateau - WP)	Major Mapping Unit Components	Approximate % of Unit	% Slope Range	Soil Textures in Typical Pedon Range and Depth (Inches)			Coarse Fragments (% 3 inches)	Permeability (In./Hr.)	Available Water Capacity (In./Hr.)	pH Range	Wind Erodibility Group (WEG)	Water Erosion Hazard
				Surface	Subsoil	Substratum						
SHALLOW SANDY												
Simona loamy fine sand (SD)	Simona	65	1-9	0-4 LFS	4-15 GRFSL	15 Indurated Caliche	0-5	2.0-6.0	.09-.15	7.4-8.4	2	slight
	Other soils and landforms	35										
Aftaden - Rock outcrop association (SD)	Aftaden	50	1-15	0-2 LS	2-18 FSL	18 Basalt Bedrock	0-35	2.0-20.0	.06-.13	6.6-7.8	2	slight
	Rock outcrop	20	1-15									
	Onite	20	1-5	0-5 LS	5-18 SL	18-60 LS	0	2.0-20.0	.06-.12	7.4-8.4	2	moderate
	Other soils and landforms	10										
Minlith - Rock outcrop association (SD)	Minlith	50	1-15	0-3 LS	3-13 VGLS	13 Basalt Bedrock	0-25	6.0-20.0	.03-.09	6.6-8.4	2	slight
	Rock outcrop	20	1-15									
	Onite	20	1-5	0-5 LS	5-27 SL	27-60 LS	0	2.0-20.0	.06-.12	7.4-8.4	2	moderate
	Other soils and landforms	10										
LOAMY												
Reakor - Dona Ana association (SD)	Reakor	50	1-5	0-3 SIL	3-13 SICL	13-60 SICL	0	0.6-2.0	0.11-.20	7.4-8.4	4L	slight
	Dona Ana	25	1-5	0-3 FSL	3-21 SCL	21-60 CL, SCL	0	0.6-6.0	.10-.17	7.4-8.4	3	moderate
	Other soils and landforms	25										
LaFonda loam (WP)	La Fonda	80	0-5	0-4 L, SIL, SICL	4-40 CL	40-60 SICL	0	0.6-2.0	.15-.20	7.4-8.4	4L	moderate
	Other soils and landforms	20										
BOTTOMLAND												
Mimbres association (SD)	Mimbres	80	0-5	0-10 SICL	10-19 SICL	19-60 SICL	0	0.2-0.6	0.16-.21	7.4-8.4	6	moderate
	Other soils and landforms	20										
Mimbres and Verhalen soils (SD)	Mimbres	50	0-1	0-3 SICL	3-36 SICL	36-60 SICL, SCL	0	0.2-2.0	.13-.19	7.4-8.4		moderate
	Verhalen	45	0-1	0-5 SICL		5-60 SIC, C	0	.06-.2	.10-.13	7.9-8.4		moderate
	Other soils and landforms	5										
Stellar - Continental association (SD)	Stellar	60	1-9	0-2 L, SICL	2-38 CL, C	38-60 CL	0-5	.06-2.0	.10-.21	6.1-8.4	6	moderate
	Continental	25	1-9	0-2 FSL, SCL	2-45 CL, SCL	45-60 SCL	0-15	.06-2.0	.07-.14	7.4-8.4	-	moderate
	Other soils and landforms	15										
Dalby Clay (SD)	Dalby	70	0-3	0-60 clay			0	.06-.20	.08-.12	8.5-9.0	4	slight
	Other soils and landforms											
Marcial silty clay loam (SD)	Marcial	80	0-3	0-4 SICL, SIC	4-41 C	41-60 C	0	.06-2.0	.09-.12	7.9-9.0	4L	slight
	Other soils and landforms	20										
Largo - Sotim association (SD)	Largo	55	1-5	0-4 SIL		4-60 CL	0	0.2-2.0	.13-.21	7.4-8.4	4L	moderate
	Sotim	25	1-5	0-3 SICL	3-29 CL	29-60 L, CL	0	0.2-6.0	.06-.19	7.4-8.4	4L	moderate
	Other soils and landforms	20										

APPENDIX C-2 (concluded)
PHYSICAL AND CHEMICAL PARAMETERS FOR SOIL SERIES

RANGE SITE

Column (a)	(b)	(c)	(d)	(e)			(f)	(g)	(h)	(i)	(j)	(k)
Soil Mapping Unit and MLRA (Southern Desert - SD Western Plateau - WP)	Major Mapping Unit Components	Approximate % of Unit	% Slope Range	Soil Textures in Typical Pedon Range and Depth (Inches) Surface	Subsoil	Substratum	Coarse Fragments (% 3 inches)	Permeability (In./Hr.)	Available Water Capacity (In./Hr.)	pH Range	Wind Erodibility Group (WEG)	Water Erosion Hazard
Glendale - Gila complex (SD)	Glendale	30	0-3	0-3 SICL		3-60 SICL	0	0.6-2.0	.13-.21	7.9-8.4	-	slight
	Gila	30	0-3	0-8 VFSL		8-60 FSL	0	0.6-2.0	.13-.20	7.9-8.4	-	slight
	Other soils and landforms	40										
CLAYEY												
Stellar association (SD)	Stellar	40	0-3	0-3 CL	3-60 CL, SCL		0-5	.06-0.6	.14-.21	7.4-8.4	6	slight
	Stellar, flooded	40	0-2	0-5 CL	5-31 C	31-60 CL	0-5	.06-0.6	.14-.21	7.4-8.4	4	slight
	Other soils and landforms											
Manzano association (WP)	Manzano	60		0-10 L, SIL, CL		10-60 CL, SICL, SIL, L	0	0.6-2.0	.13-.21	6.6-8.4	4L	moderate
SALT FLATS												
Hondale - Mimbres complex (SD)	Hondale	75	0-1	0-5 L	5-41 C, CL, SCL	41-60 L		.06-2.0	.07-.11	8.5-9.0	moderate	slight
	Mimbres	20	0-1	0-3 SICL	3-36 SICL	36-60 SICL SCL	0	0.2-2.0	.13-.19	7.4-8.4	moderate	slight
	Other soils and landforms	5										
Hondale - Bluepoint complex (SD)	Hondale	45	0-5	0-7 SCL	7-41 C, CL, SCL	41-60 L	0	.06-2.0	.07-.11	8.5-9.0	moderate	slight
	Bluepoint	45	0-5	0-6 LS		6-60 LS		6.0-20.0	.06-.08	7.4-7.8	severe	slight
	Other soils and landforms	10										
MALPAIS												
Akela very gravelly loam (SD)	Akela	55	1-15	0-3 VGRL	3-14 GRL VGRL	14 Basalt Bedrock	5-40	0.6-2.0	.05-.10	7.4-8.4	7	slight
	Other soils and landforms	45										
BREAKS												
Goldust very gravelly clay loam (WP)	Goldust	90	5-55	0-8 VGRCL, VGRL, VCOBCL	8-31 GRC, VGRC	31-60 Stratified Alluvium w/various textures	NA	NA	NA	NA	NA	NA
	Other soils and landforms	10										

APPENDIX C-3

WIND ERODIBILITY GROUPS (WEG)

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped (1 through 8) according to the following distinctions:

1 - Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2 - Loamy sands, loamy fine sands, and loamy very fine sands. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3 - Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L- Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4 - Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5 - Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonates. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6 - Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are slightly erodible, and crops can easily be grown.

7 - Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are slightly erodible and crops can easily be grown.

8 - Stony or gravelly soils and other soils not subject to soil blowing.

APPENDIX C-4

PSIAC METHODOLOGY FOR CALCULATING SEDIMENT YIELD

The PSIAC method can be used to estimate annual sediment yield of large areas and is flexible enough to objectively analyze areas ranging from less than an acre to greater than 10 square miles in size. The ability of the user to properly rate the nine factors of the method is its strength, as there is flexibility to adjust with the introduction of additional information. Previous studies indicate that PSIAC correlates with measured yields. By definition, the method develops an estimate of a relative range of values whereby one can objectively compare areas, treatments, and/or expected magnitude of change over areas that range greatly in size. Expressing the values in specific units does not detract from the usefulness of the results, and provides some measure of the physical meaning of the numbers, even if approximate. An alternative methodology such as the Universal Soil Loss Equation was designed for developed areas, and has not been adapted and checked for use in vast areas of natural lands. It requires a sediment transport and channel erosion model to arrive at sediment production. A large number of small study areas would be required to develop estimates; these would be very time consuming for an area as large as the Southern Rio Grande Planning Area.

The following tables are the PSIAC Sediment Yield Factor Rating Form (Form 7310-16) and additional information on rating each of the factors.

APPENDIX C-4 (cont'd)

PSIAC SEDIMENT YIELD FACTOR RATING FORM

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SEDIMENT YIELD FACTOR RATING

SURFACE GEOLOGY (a)	SOILS (b)	CLIMATE (c)	RUNOFF (d)	TOPOGRAPHY (e)
(10) a. Marine shales and related mudstones and siltstones	(10) a. Fine textured; easily dispersed; saline-alkaline; high shrink-swell characteristics b. Single grain silts and fine sands	(10) a. Storms of several days' duration with short periods of intense rainfall b. Frequent intense convective storms c. Freeze-thaw occurrence	(10) a. High peak flows per unit area b. Large volume of flow per unit area	(20) a. Steep upland slopes (in excess of 30%) b. High relief; little or no floodplain development
(5) a. Rocks of medium hardness b. Moderately weathered c. Moderately fractured	(5) a. Medium textured soil b. Occasional rock fragments c. Caliche layers	(5) a. Storms of moderate duration and intensity b. Infrequent convective storms	(5) a. Moderate peak flows per unit area b. Moderate volume of flow per unit area	(10) a. Moderate upland slopes (less than 20%) b. Moderate fan or floodplain development
(0) a. Massive, hard formations	(0) a. High percentage of rock fragments b. Aggregated clays c. High in organic matter	(0) a. Humid climate with rainfall of low intensity b. Precipitation in form of snow c. Arid climate, low intensity storms d. Arid climate; rare convective storms	(0) a. Low peak flows per unit area b. Low volume of runoff per unit area c. Rare runoff events	(0) a. Gentle upland slopes (less than 5%) b. Extensive alluvial plains
Factor value				

GROUND COVER (f)	LAND USE (g)	UPLAND EROSION (h)	CHANNEL EROSION AND SEDIMENT TRANSPORT (i)
(10) Ground cover does not exceed 20% a. Vegetation sparse; little or no litter b. No rock in surface soil	(10) a. More than 50% cultivated b. Almost all of area intensively grazed c. All of area recently burned	(25) a. More than 50% of the area characterized by rill and gully or landslide erosion	(25) a. Eroding banks continuously or at frequent intervals with large depths and long flow duration b. Active headcuts and degradation in tributary channels
(0) Cover not exceeding 40% a. Noticeable litter b. If trees present understory not well developed	(0) a. Less than 25% cultivated b. 50% or less recently logged c. Less than 50% intensively grazed d. Ordinary road and other construction	(10) a. About 25% of the area characterized by rill and gully or landslide erosion b. Wind erosion with deposition in stream channels	(10) a. Moderate flow depths, medium flow duration with occasionally eroding banks or bed
(−10) a. Area completely protected by vegetation, rock fragments, litter b. Little opportunity for rainfall to reach erodible material	(−10) a. No cultivation b. No recent logging c. Low intensity grazing	(0) a. No apparent signs of erosion	(0) a. Wide shallow channels with flat gradients and short flow duration b. Channels in massive rock, large boulders, or well vegetated c. Artificially controlled channels
Factor value			

Subtotal (a) – (g)	Subtotal (h) – (i)	TOTAL RATING — — — = — —.— ac.ft./sq. mi./yr.

(Instructions on reverse)

Form 7310–16 (July 1971)

EXAMPLES OF HIGH AND LOW FACTORS OF THE PSIAC METHOD

Factor	Rating Range	Main Characteristics Considered	High Value	Low Value
Surface geology	0 - 10	Rock Type Hardness Weathering Fracturing	Soft fissile shale	Thick basalt flow
Soils	0 - 10	Texture Aggregation Shrink-swell Organic matter Rockiness Salinity Caliche	Non-aggregated silty clays	Loamy sand
Climate	0 - 10	Storm frequency, intensity, duration Snow Freeze-thaw	Frequent intense storms	50% snow precipitation
Runoff	0 - 10	Volume per unit area Peak flow per unit area	August peak flow	April peak flow
Topography	0 - 20	Steepness of slopes Relief Fan and flood plain development	30% slopes	5% slopes
Ground cover	-10 - 10	Vegetation Litter Rocks	30% total ground cover	70% total ground cover
Land use (grazing)	-10 - 10	Grazing intensity Percentage cultivated	60% utilization	20% utilization
Upland erosion	0 - 25	Rills, gullies, arroyos, landslides Wind deposits in channels	50% gullies, rills, arroyos	No visible flow patterns
Channel erosion and sediment transport	0 - 25	Bank and bed erosion Flow depths Active headcuts Vegetation in channels	Active headcuts and eroding banks	Flat gradients, wide channels

APPENDIX D
WILDLIFE

APPENDIX D-1

WILDLIFE SPECIES THAT MAY OCCUR IN THE SOUTHERN RIO GRANDE PLANNING AREA

Key: Preferred Habitats - (1) Riparian; (2) Pseudoriparian; (3) Grass Rolling Upland; (4) Grass Flats; (5) Grass Mountains; (6) Mixed Shrub Rolling Uplands; (7) Mixed Shrub Mountain; (8) Mesquite Rolling Uplands; (9) Half Shrub Rolling Upland; (10) Pinyon-Juniper Grass Mountain; (11) Creosote Rolling Upland; (12) Creosote Breaks; (13) Mesquite Dune; (14) Malpais; (15) Special Habitat Feature*; (NP) None

*Special Habitat Features (SHF) include natural and man-made features and include old building, stock waters, cliffs, rock outcrops, caves, mine tunnels, etc. A large majority of the listed species with a SHF preferred habitat are associated with earth tanks.

Notes: V - Verified. Occurrence substantiated by records gathered by EIS field team.

* - Threatened, endangered, or sensitive species.

Numbers after each species refer to preferred habitat types as given in American Ag Interl. Contract Report.

Source: Habitat Descriptions and Wildlife Inventory Results of the Southern Rio Grande EIS Area, 1979.

American Ag International Contract Report, 1979.

Gerald Wisdom, New Mexico Department of Game and Fish, Las Cruces, 1980.

APPENDIX D-1 (cont'd)

LIST OF THE AVIAN SPECIES THAT MAY OCCUR IN THE SOUTHERN RIO GRANDE PLANNING AREA

Common loon	15	
Arctic loon		
Eared grebe	15	V
Western grebe	15	V
Pied-billed grebe	15	V
White pelican	15	V
Double-crested cormorant	1, 15	V
*Olivaceous cormorant	1, 15	
Anhinga	1, 15	
Magnificent frigatebird	NP	V
Great blue heron	1, 15	V
Green heron	1	
Little blue heron	1, 15	
Cattle egret		
Great egret	1	
Snowy egret	15	V
Louisiana heron	1, 15	
Black-crowned night heron	1	V
Least bittern	15	
American bittern	15	V
Wood stork		
White-faced ibis	15	V
Whistling swan	15	
Canada goose	15	V
White-fronted goose	15	
Snow goose	15	V
Ross' goose	15	
Fulvous whistling duck	1	
Mallard	15	V
Mexican duck	15	V
Gadwall	15	V
Pintail	15	V
Green-winged teal	15	V
Blue-winged teal	15	V
Cinnamon teal	15	V
European widgeon	15	V
American widgeon	15	V
Shoveler	15	V
Wood duck	1	
Redhead	15	V
Ring-necked duck	15	V
Canvasback	15	V
American coot	15	V
Killdeer	15	V
Mountain plover	3, 4, 5	
Black-bellied plover	15	
American woodcock		
Common snipe	15	V
Long-billed curlew	15	V
Whimbrel	15	V
Upland plover	1, 4	
Spotted sandpiper	15	V
Solitary sandpiper	15	V
Willet	15	V
Greater yellowlegs	15	V
Lesser yellowlegs	15	V
Knot		V
Pectoral sandpiper	15	V
Baird's sandpiper	15	
White-rumped sandpiper	15	
Least sandpiper	15	V
Western sandpiper	15	V
Dunlin	15	
Long-billed dowitcher	1	V
Semipalmated sandpiper	15	V
Marbled godwit	1	V
Sanderling	15	
American avocet	15	V
Black-necked stilt	15	V
Wilson's phalarope	15	V

Lesser scaup	15	V
Common goldeneye	15	V
American goldeneye		
Bufflehead	15	V
Ruddy duck	15	V
Hooded merganser	1	
Common merganser	15	V
Turkey vulture	NP	V
Black vulture	NP	V
White-tailed kite		
*Mississippi kite		
Sharp-shinned hawk	NP	V
Cooper's hawk	NP	V
Red-tailed hawk		V
Swainson's hawk	8	V
Rough-legged hawk	3, 4, 5	V
Zone-tailed hawk	1	
White-tailed hawk	3, 4, 5	
Ferruginous hawk	3, 4, 5	V
Harris hawk	8	
*Black hawk	1	
Golden eagle	NP	V
*Bald eagle	1	V
Marsh hawk	3, 4, 5	V
Osprey	15	V
*Caracara	3, 4, 5	
Prairie falcon	3, 4, 5	V
*Peregrine falcon	NP	V
*Aplomado falcon	3, 4, 5, 9	
Merlin	NP	V
American kestrel	NP	V
Scaled quail	3, 4, 5, 11	V
Gambel's quail	2	V
Harlequin quail	5	V
Turkey	5	V
Ring-necked pheasant	1	
Sandhill crane	4	V
*Whooping crane		V
Virginia rail	15	
Sora	15	V
Common gallinule	15	
Roadrunner	NP	V
Groove-billed ani	1	
Barn owl	11, 12	V
Great horned owl	1	V
Pygmy owl	13	V
Burrowing owl	13	V
Long-eared owl	3, 4, 5	V
Short-eared owl	3, 4	V
Saw-whet owl	1	
Whip-poor-will	1	
Poor-will	1, 2	V
Common nighthawk	1, 15	V
Lesser nighthawk	1, 15	V
White-throated swift	1	V
Black-chinned hummingbird	1	V
Costa's hummingbird	2, 3, 4, 5	
Anna's hummingbird		
Broad-tailed hummingbird	1	V
Rufous hummingbird	1	V
Calliope hummingbird	1, 7	
Rivoli's hummingbird	7	V
Blue-throated hummingbird	1	V
Belted kingfisher	1	V
Common flicker	1	V
Acorn woodpecker	10	V
Lewis' woodpecker	10	
Yellow-bellied sapsucker	1	V
Williamson's sapsucker	1	

APPENDIX D-1 (cont'd)

LIST OF THE AVIAN SPECIES THAT MAY OCCUR IN THE SOUTHERN RIO GRANDE PLANNING AREA

Northern phalarope	15	V
Thayer's gull	15	
Ring-billed gull	15	
Franklin gull	15	V
Bonaparte's gull	15	
Forster's tern	15	V
Black tern	15	V
Band-tailed pigeon	10	V
Rock dove	NP	V
White-winged dove	1	V
Mourning dove	1, 2	V
Ground dove	1	
Inca dove	1, 4	
Yellow-billed cuckoo	1	
Eastern phoebe	NP	
Willow flycatcher		V
Hammond's flycatcher	1	
Dusky flycatcher	1	V
Gray flycatcher	10	
Coues' flycatcher	7, 10	V
Western wood pewee	1	V
Olive-sided flycatcher	10	V
Vermilion flycatcher	1	V
Horned lark	3	V
Violet-green swallow	9	V
Tree swallow	1	V
Bank swallow	1	V
Rough-winged swallow	15	V
Barn swallow	15	V
Cliff swallow	1	V
Purple martin	10	
Mexican jay	10	V
Blue jay		
Steller's jay	1	V
Scrub jay	10	V
Black-billed magpie		
Common raven	NP	V
White-necked raven	3, 4	V
Common crow	NP	
Pinon jay	10	V
Clark's nutcracker	10	
Mountain chickadee	10	V
Plain titmouse	10	V
Bridled titmouse	10	V
Verdin	12	V
Common bushtit	1, 10	V
White-breasted nuthatch	10	V
Red-breasted nuthatch	10	
Pygmy nuthatch	10	
Brown creeper	10	
Dipper	1	V
House wren	NP	V
Bewick's wren	10	V
Cactus wren	6, 7	V
Long-billed marsh wren	15	
Canyon wren	6, 7	V
Rock wren	5, 7	V
Mockingbird	NP	V
Black-throated gray warbler	10	
Townsend's warbler	2	V
Black-throated green warbler		10
Grace's warbler	10	V
Ovenbird	1	
Northern waterthrush	15	
MacGillivray's warbler	2	V
Yellowthroat	15	
Yellow-breasted chat	1	V
Red-faced warbler	10	
Wilson's warbler	1	V
American redstart	1	V
Hairy sapsucker	1	V
Downy woodpecker	1	
Ladder-backed woodpecker	1	V
Eastern kingbird	1, 2	
Western kingbird	1	V
Cassin's kingbird	1, 2	V
Scissor-tailed flycatcher	11, 12	
Ash-throated flycatcher	1	V
Black phoebe	1	V
Say's phoebe	13	V
Traill's flycatcher	1	V
Western flycatcher	1	V
*Buff-breasted flycatcher	1, 7	V
*Beardless flycatcher	1	V
Catbird	1	
Brown thrasher	10	V
Bendire's thrasher	8, 11, 12	V
Curve-billed thrasher	13	V
Crissal thrasher	6, 13	V
Sage thrasher	7	V
Robin	1	V
Hermit thrush	10	V
Wood thrush	10	V
Swainson's thrush	10	V
Eastern bluebird	10	
Western bluebird	10	V
Mountain bluebird	10	V
Townsend's solitaire	5	V
Blue-gray gnatcatcher	2	V
Black-tailed gnatcatcher	12	V
Golden tailed kinglet	10	
Ruby-crowned kinglet	15	V
Water pipit	15	V
Sprague's pipit	3, 4, 5	
Bohemian waxwing		V
Cedar waxwing	10	V
Phainopepla	7	V
Loggerhead shrike	NP	V
Starling	NP	V
Hutton's vireo	10	V
*Bell's vireo	1	V
Gray vireo	10	V
Solitary vireo	1	V
Philadelphia vireo	1	V
Warbling vireo	1	V
Orange-crowned warbler	1	V
Black-and-white warbler	1	
Prothonotary warbler		
Worm-eating warbler		
Tennessee warbler	1	V
Nashville warbler	1	V
Virginia's warbler	1	V
Lucy's warbler	1	V
Parula warbler	1	
Yellow warbler	1	V
Black-throated blue warbler		V
Yellow-rumped warbler		V
Cassin's finch	10	V
House finch	NP	V
Pine siskin	10	V
American goldfinch	3, 4, 5	
Lesser goldfinch	1	V
Lawrence's goldfinch	15	
Red crossbill	10	
Green-tailed towhee	2	V
Rufous-sided towhee	7	V
Brown towhee	10	V
Lark bunting	4	V
*Baird's sparrow	3, 4, 5	

APPENDIX D-1 (cont'd)

LIST OF THE AVIAN SPECIES THAT MAY OCCUR IN THE SOUTHERN RIO GRANDE PLANNING AREA

Painted redstart	10	V
House sparrow	NP	V
Eastern meadowlark	3, 4, 5	
Western meadowlark	3, 4, 5	V
Yellow-headed blackbird	15	V
Red-winged blackbird	1	V
Orchard oriole	1	
Hooded oriole	1	
Scott's oriole	6, 7, 13	V
Northern oriole		V
Brewer's blackbird	1	V
Great-tailed grackle	2	V
Common grackle		V
Brown-headed cowbird	1	V
Western tanager	10	V
Hepatic tanager	10	V
Summer tanager	2	V
Cardinal	1	
Pyrrhuloxia	2	V
Rose-breasted grosbeak	6, 7	V
Black-headed grosbeak	6, 7	V
Blue grosbeak	1	V
Indigo bunting	NP	
Lazuli bunting	1	
Painted bunting	10	
Dickcissel	4, 9	V
Evening grosbeak	1	V
Field sparrow	4	V
Vesper sparrow	9	V
Lark sparrow	B	V
Rufous sparrow		V
Cassin's sparrow	3, 4, 5	V
Black-throated sparrow	11	V
Sage sparrow	3	V
Dark-eyed junco		V
Oregon junco	5	V
Gray-headed junco	10	V
Chipping sparrow	1	V
Clay-colored sparrow	3, 4	V
Botteri's sparrow	2	
Brewer's sparrow	B, 13	V
Black-chinned sparrow	10	V
Harris' sparrow	10	V
White-crowned sparrow	15	V
Golden-crowned sparrow		
Grasshopper sparrow	3	V
White-throated sparrow	1	
Fox sparrow	1	V
Lincoln's sparrow	1	
Swamp sparrow	15	
Song sparrow	1	V
*McCown's longspur	5	
Chestnut-collared longspur	3, 4, 5	V
Savannah sparrow	4	V

REPTILES AND AMPHIBIANS OF THE SOUTHERN RIO GRANDE PLANNING AREA

Tiger salamander	15	*Ambystoma tigrinum*	V
Plains spadefoot	3, 4, 5	*Scaphiopus bombifrons*	
Western spadefoot	15	*S. hammondi*	V
Couch's spadefoot	11	*S. couchi*	V
Great plains toad	7, 2, 1	*Bufo cognatus*	V
Texas toad	15	*B. speciosus*	V
Desert toad	B	*B. punctatus*	V
Little green toad	11, 12	*B. debilis*	V
Woodhouse's toad	1	*B. woodhousei*	
Canyon tree frog	1	*Hyla arenicolor*	
Leopard frog	1, 15	*Rana pipiens*	V
Bullfrog	1, 15	*R. catesbeiana*	V
Spiny softshell	1	*Trionyx spiniferus*	
Western box turtle	8	*Terrapene ornata*	V
Painted turtle	1	*Chrysemys picta*	
Pond slider	15	*C. scripta*	
Yellow mud turtle	1, 15	*Kinosternon flavescens*	V
Great plains skink	1	*Eumeces obsoletus*	
Many-lined skink	1, 3, 4	*E. multivirgatus*	
Western whiptail	9	*Cnemidophorus tigris*	V
Checkered whiptail	11, 12	*C. tesselatus*	V
New Mexico whiptail	2	*C. neomexicanus*	V
Chihuahua whiptail	5, 10	*C. exsanguis*	V
Desert-grassland whiptail	9, 2	*C. uniparens*	V
Little stripped whiptail	9	*C. inornatus*	V
Plateau whiptail	10	*C. velox*	V
Roundtailed horned lizard	11	*Phrynosoma modestum*	V
Short-horned lizard	7	*P. douglassi*	V
Texas horned lizard	4	*P. cornutum*	V
*Gila monster	6	*Heloderma suspectum*	
Greater earless lizard	3, 4, 5	*Cophosaurus texanum*	V
Lesser earless lizard	13	*Holbrookia maculata*	V
Clark's spiny lizard	1	*Sceloporus clarki*	
Desert spiny lizard	5	*S. magister*	V

APPENDIX D-1 (cont'd)

REPTILES AND AMPHIBIANS OF THE SOUTHERN RIO GRANDE PLANNING AREA

Crevice spiny lizard	2	S. poinsetti	V
Eastern fence lizard	11, 12	S. undulatus	V
Collared lizard	3, 4	Crotaphytus collaris	V
Leopard lizard	11, 12	C. wislizenii	V
Tree lizard	1	Urosaurus ornatus	V
Side-blotched lizard	13	Uta stansburiana	V
Texas blindsnake	5	Leptotyphlops dulcis	
Western blindsnake	11, 12	L. humilis	
Massasauga	9	Sistrurus catenatus	
Rock rattlesnake	7	Crotalus lepidus	V
Western diamondback	11, 12	Crotalus atrox	V
Prairie rattlesnake	4	C. viridis	V
Black-tailed rattlesnake	6, 7	C. molossus	V
Western hognose snake	2, 1	Heterodon nasicus	V
Smooth green snake	1	Opheodrys vernalis	
Corn snake	1	Elaphe guttata	
*Trans-Pecos ratsnake	9	E. subocularis	
Gopher snake	11, 12	Pituophis melanoleucus	V
Checkered garter snake	1	Thamnophis marcianus	
Common garter snake	1	T. sirtalis	V
Black-necked garter snake	1	T. cyrtopsis	V
Long-nosed snake	11, 12	Rhinocheilus lecontei	V
Lyre snake	11, 12	Trimorphodon biscutatus	
Glossy snake	7	Arizona elegans	V
Milk snake	1	Lampropeltis triangulum	
Common kingsnake	1	L. getulus	
*Sonora Mt. Kingsnake	5, 10	L. pyromelana	
Mountain patched-nosed snake	1	Salvadora grahamiae	V
Big Bend patched-nosed snake	1, 7, 5	S. deserticola	V
Coachwhip snake	1	Masticophis flagellum	V
Sonora whipsnake	6, 7	M. bilineatus	
Striped whipsnake	10	M. taeniatus	V
Ringneck snake	1	Diadophis punctatus	
Western ground snake	1, 2	Sonora semiannulata	
Western black-headed snake	6, 7	Tantilla planiceps	
Plains black-headed snake	11	T. nigriceps	V
Western hook-nosed snake	3, 4, 5	Gyalopion canum	
Night snake	3, 4, 5	Hypsiglena torquata	V

MAMMALS OF THE SOUTHERN RIO GRANDE PLANNING AREA

Hispid pocket mouse	3	P. hispidus	V
Rock pocket mouse	11, 12	P. intermedius	V
Desert pocket mouse	1	P. penicillatus	
Ord's kangaroo rat	13	Dipodomys ordii	V
Merriam's kangaroo rat	11, 12	D. merriami	V
Banner-tailed kangaroo rat	3, 4, 5	D. spectabilis	V
Beaver	1	Castor canadensis	
Plains harvest mouse	4	Reithrodontomys montanus	V
Western harvest mouse	4	R. megalotis	V
Cactus mouse	11	Peromyscus eremicus	V
Deer mouse	3, 4	P. maniculatus	V
Whitefooted mouse	3, 4	P. leucopus	V
Brush mouse	10	P. boylii	V
Pinyon mouse	10	P. truei	V
Rock mouse	B	P. difficilis	
Northern grasshopper mouse	13	Onychomys leucogaster	V
Southern grasshopper mouse	11, 12	O. torridus	V
Hispid cotton rat	4	Sigmodon hispidus	V
Tawny-bellied cotton rat	4	S. fulviventer	V
Yellow-nosed cotton rat	5	S. ochrognathus	
Southern woodrat	11	Neotoma micropus	

APPENDIX D-1 (cont'd)

MAMMALS OF THE SOUTHERN RIO GRANDE PLANNING AREA

White-throated woodrat	7	*N. albigula*	V
Mexican woodrat	7	*N. mexicana*	
Muskrat	1	*Ondatra zibethicus*	
Porcupine	2	*Erethizon dorsatum*	V
Coyote	NP	*Canis latrans*	V
*Gray wolf	NP	*C. lupus*	
Red fox	1	*Vulpes fulva*	
Kit fox	4	*V. macrotis*	V
Gray fox	10	*Urocyon cinereoargenteus*	V
Ringtail	1	*Bassariscus astutus*	V
Raccoon	1	*Procyon lotor*	V
Longtailed weasel	1	*Mustela frenata*	V
Badger	3, 5	*Taxidea taxus*	V
Western spotted skunk	1	*Spilogale gracilis*	
Striped skunk	11	*Mephitis mephitis*	V
Hooded skunk	1	*M. macroura*	
Hognosed skunk	12	*Conepatus mesoleucas*	V
Mountain lion	NP	*Felis concolor*	V
Bobcat	10	*Lynx rufus*	V
Black bear	10, 7	*Ursus americanus*	V
Mule deer	2	*Odocoileus hemionus*	V
Whitetail deer	7	*O. virginianus*	
Pronghorn	3	*Antilocapra americana*	V
Bighorn sheep	7	*Ovis canadensis mexicanus*	
Collared peccary	6, 2	*Dicotyles tajacu*	
Virginia opossum	1	*Didelphis virginiana*	
Vagrant shrew	5	*Sorex vagrans*	
Desert shrew	1, 2	*Notiosorex crawfordi*	
Cave myotis	NP	*Myotis velifer*	V
Yuma myotis	11, 12	*M. yumanensis*	V
Little brown myotis	NP	*M. lucifugus*	V
Southwestern myotis	NP	*M. auriculus*	
Fringed myotis	NP	*M. thysanodes*	V
Long-legged myotis	NP	*M. volans*	
California myotis	1	*M. californicus*	V
Small-footed myotis	1	*M. leibii*	V
Silverhaired bat	1	*Lasionycteris noctivagans*	
Western pipistrelle	1, 15	*Pipistrellus hesperus*	V
Big brown bat	NP	*Eptesicus fuscus*	V
Red bat	1	*Lasiurus borealis*	
Hoary bat	1	*L. cinereus*	
*Southern yellow bat	1	*L. ega*	
Spotted bat	NP, 15	*Euderma maculatum*	
Western big-eared bat	NP	*Plecotus townsendii*	V
Pallid bat	11, 12	*Antrozous pallidus*	V
Brazilian freetailed bat	2	*Tadarida brasiliensis*	
Pocketed freetailed bat	NP	*T. femorosacca*	
Big freetailed bat	NP	*T. macrotis*	
Western mastiff bat	NP	*Eumops perotis*	
Eastern cottontail	7, 10, 2	*Sylvilagus floridanus*	
Audubon's cottontail	2	*S. audubonii*	V
Black-tailed jackrabbit	11, 8, 13	*Lepus californicus*	V
Cliff chipmunk	10	*Eutamias dorsalis*	V
Gray-collared chipmunk	10	*E. cinereicollis*	V
Texas antelope squirrel	2, 10, 11 12	*Ammospermophilus interpres*	V
13-lined ground squirrel	9	*Spermophilus tridecemlineatus*	
Spotted ground squirrel	13	*S. spilosoma*	V
Rock squirrel	10	*S. variegatus*	V
Golden-mantled ground squirrel	10, 6	*S. lateralis*	
Black-tailed prairie dog	3, 4	*Cynomys ludovicianus*	
Gunnison's prairie dog	5	*C. gunnisonii*	
Botta's pocket gopher	5	*Thomomys bottae*	V
Desert pocket gopher		*Geomys arenarius*	V
Yellow-faced pocket gopher	13	*Pappogeomys castanops*	
Silky pocket mouse	4	*Perognathus flavus*	V
Plains pocket mouse	3, 4	*P. flavescens*	

APPENDIX D-1 (concluded)

FISHES OF THE SOUTHERN RIO GRANDE PLANNING AREA
(State listed endangered species added to list)

Gizzard Shad	Dorosoma cepedianum
Rainbow Trout	Salmo gairdneri
Brown Trout	Salmo trutta
Northern Pike	Escox lucius
River Carpsucker	Carpiodes carpio
White Sucker	Catostomus commersoni
Smallmouth Buffalo	Ictiobus bubalos
*Mexican Tetra	Astyanax mexicana
Goldfish	Carassius auratus
Carp	Cyprinus carpio
*Bluntnose Shiner	Notropis simis
Red Shiner	Notropis lutrensis
*Silvery Minnow	Hybognathus nuchalis
Fathead Minnow	Pimephales promelas
Blue Catfish	Ictalurus furcatus
Black Bullhead	Ictalurus melas
Yellow Bullhead	Ictalurus natalis
Channel Catfish	Ictalurus punctatus
Flathead Catfish	Pylodictis olivaris
Mosquitofish	Gambusia affinis
White Bass	Morone chrysops
Striped Bass	Morone Sayatilis (Walbaum)
Warmouth	Lepomis gulosus
Green Sunfish	Lepomis cyanellus
Bluegill	Lepomis macrochirus
Longear Sunfish	Lepomis megalotis
Largemouth Bass	Micropterus salmoides
White Crappie	Pomoxis annularis
Black Crappie	Pomoxis nigromaculatus
Yellow Perch	Perca flavescens
Walleye	Stizostedion vitreum

APPENDIX D-2

METHODOLOGY

Wildlife

The basic wildlife inventory for the Southern Rio Grande Planning Area is described as follows by members of the inventory team (Kuykendall, et al., 1979):

The Integrated Habitat Inventory and Classification System, BLM Manual 6602, serves as the general guideline for wildlife data collection and habitat analysis. Methods were developed and modified to accommodate time frame restrictions and total land mass.

Mapping

No definitive criteria were provided to accurately determine or delineate standard habitat sites (SHS's). In order to establish a system of standard habitats, guidelines were developed based on analysis of typing data for each site write-up area (SWA). Each SWA was analyzed as to condition class, soils, vegetative species composition, and landform. SWAs were then assigned to one of the SHS's. During the early stages of the project many narrowly defined SHS's were delineated. These were later combined into major vegetative associations. As types were mapped, discretion was used to place small acreage SWAs into SHS's which surrounded those areas. Some SWAs in which dominant vegetative composition could not be determined were treated in like manner.

Mammal Data

Traplines for small mammal occurrence were conducted in each of the standard habitat sites. Each trapline consisted of 50 traps spaced at intervals of ten paces through a representative portion of the SHS. Where traplines consisted of numbers other than 50, a notation was made on the transect sheet. Three sizes of snap traps were used: museum specials, large standard rat traps, and the smaller standard mouse trap. Field sampling over the period of 1 year indicated that the basic trapline should be composed of one rat trap per five museum specials. The small mouse traps proved generally ineffective. Baits used were peanut butter, rolled oats, or a mixture of the two. During the warmer months, baits were mixed with rotenone or dimethylpthalate to deter ants and other insects. Greater emphasis was placed on trapping during the cooler months to avoid losses due to spoilage and insect damage.

Trapping success is greatly influenced by the season, weather conditions, phase of the moon, condition of the habitat, and the trapability of certain species. For this reason the data will express implied relative abundance and must be tempered when used in this manner. The data also indicates species occurrence by SHS and seasonal activity.

Since exact densities could not be determined, relative densities are expressed as captures per trap nights. The Phoenix district conducting a similar study expressed relative densities in terms of the number of each species caught per 270 trap nights. This factor provides a more readable figure in the tables and will be used only for consistency and comparison of data.

Trapping of pocket gophers was carried out to determine species occurrence and the data was recorded by locality and soil type rather than vegetative composition.

Data for bats were collected by incidental observations, investigation of roosting sites, and by mist-netting at selected locations.

All other mammal data were recorded by incidental observations in SHS's. Comments on predators are based on sight observations and information provided by the local Animal Damage Control unit of the U.S. Fish and Wildlife Service.

Avian Data

Bird transects consisted of a modified strip transect to determine species occurrence, seasonal use, and relative abundance by SHS. Each transect was approximately one-half mile with positively identified species and number of each being recorded. Data was collected during early morning hours with time being extended if bird activity remained high. Incidental data was also recorded to augment the species occurrence data.

Herptile Data

Observations on reptiles and amphibians were gathered as incidental data and supplemented by literature records with precise locations which could be tied to SHS's.

Standard Habitat Sites (SHS's) Narratives

Chapter 2

SHS narratives in Chapter 2 were developed by combining SHS narratives in the above report, narratives in the report by American Ag International, Inc. (1979) and data developed through analysis of vegetation inventory information. Visual C shows the mapped locations of habitats.

Big game (deer and pronghorn) populations were provided by the New Mexico Department of Game and Fish (NMDG&F) by the herd units shown on Map 2-2. (See methodology for deer and pronghorn allocations.)

Deer and Pronghorn Herd Units (Map 2-2)

Basic information (present population, optimum population, area) was jointly developed by NMDG&F and BLM using available data (harvest, pellet transects, browse transects, etc.) and reflect an average population over several years. The optimum population numbers are an estimate of a reasonable population, under multiple use with habitat improvement.

The present and optimum populations were distributed among the allotments in a population area by estimating the annual production of deer forage plants, as given in the vegetation inventory data. For example, the Organ Mountain portion of the White Sands Herd Unit has an estimated present population of 720 deer. Allotment 5006 produces an estimated 2.5 percent of the available deer forage in the Organ Mountains. Therefore, 720 x .025 equals 18 deer.

For optimum populations by allotment, the existing population is increased by the amount of increase expected for a given population.

Allocations were developed as follows:

8 (approximately) deer consume 780 lbs. forage/month.
(8 deer = 1 AU)

12 pronghorn consume 780 lbs. forage/month.
(12 pronghorn = 1 AU)

Allotment 5006 - 18 deer X 12 ÷ 8 X .752% federal range = 20.3 AUMs (for allocation, rounded to 21).

For 2010 allocations, NMDG&F optimum population is used, and AU equivalents are increased. Part of the proposed action is to improve the rangeland one condition class. Dr. Marlin Springer, in a contrast report for BLM Las Cruces, concluded that on good condition rangeland in Southern New Mexico, considering diet differences, 17 deer or 19 pronghorn = 1 AU. We are then using 10 deer or 14 pronghorn per AU for 2010. Again for allotment 5006, 49.5 X 12 ÷ 1 X .752% federal range = 44.668 AUMs (rounded to 45 for allocation).

Diversity Index

Odum (1963) presents the following method to compare species diversity in different ecosystems, or in the same ecosystem at different times.

$$\frac{\text{cumulative number of species}}{\sqrt{\text{individuals counted}}}$$

Odum (1963) recognized that other diversity indices have been proposed and that there are limitations such as bias in sampling techniques. The index numbers derived by using Odum's method provide for a comparison of common and rare species in a community; as related to another community listed on Table 2-8.

Using the examples of two hypothetical communities, Community A with 100 individuals (total) of 2 species, and Community B with 200 individuals of 8 species. The diversity index numbers would be .2 for A and .56 for B under the theory that presence of rare (infrequent) species in an ecosystem represents stability of the community; the examples above show that the B Community is more stable than A with a higher representation of rare species. An extreme example of the diversity index would be a well maintained corn field where the plant diversity is very low, consisting of many individuals of one species, and having low stability. The corn field population would be subject to heavy damage from adverse weather or by invasion of a disease or pest.

Individual diversity index numbers on Table 2-8 should be used for comparison between different Standard Habitat Sites (SHS's). Under the diversity index column for small mammals, the mesquite rolling upland SHS index is 1.033 and the grass rolling upland SHS index is 1.707, implying a "healthier" community in the latter (higher index number), at least for small mammals. Impacts can be assessed from diversity indices. If chemical brush control is conducted in the mesquite rolling upland SHS and results in a change to a grass rolling upland SHS, diversity of small mammals would increase. However, bird diversity was not indexed and to predict impacts on a bird community, examination of the average structural diversity index shows a lower index number. Bird communities are recognized as being related to the vertical structure of a plant community. In the chemical treatment example, the structural diversity index is reduced from .070 to .034, implying a loss or considerable reduction of bird species requiring the brush structure in their habitat, with a concurrent improvement in the habitat for species which might be inhibited by brush structure.

Standard Habitat Sites Comparison Data - Table 2-8

The individual diversity index columns of Table 2-8 were developed by:

Diversity Index Plants. A group of SWAs which are included in an SHS were selected to represent each SHS. Selections were made prior to review of vegetation data and are assumed to be accurate and random representations of each SHS, and the present average condition of each SHS. The total number of plants per acre from the vegetation inventory and number of plant species were used in diversity calculations. Using plants per acre rather than actual sample is a deviation from Odum's method but does provide index numbers suitable for comparisons.

Average Number Plant Species. Average of plant species recorded in the vegetation inventory data for SWAs used as representative of an SHS.

Number of Vertebrate Species Using as Preferred. American Ag International, Inc. (1979) rated the SHS's used by each vertebrate species according to the value of the SHS to the species (see Table 2-9, endangered species as an example), using numerals. A number 1 indicates the most valuable habitat for a species. Species counted for this column are shown in the American Ag Chart as having more than one preferred habitat (more than one number 1 under SHS columns).

Number Vertebrate Species Reliant on SHS for Preferred. As for number of vertebrate species using as preferred, these species are shown by American Ag (1979) as occurring in only one habitat which is numerically rated as 1.

Estimated Relative Small Mammal Biomass Grams/Trap Night. Average weights were estimated for each species of small mammals from weight ranges provided by Davis (1960). Small mammal inventory data were expressed as relative abundance based on number of captures of each species for 270 trap nights. Weights were substituted for numbers by species to calculate biomass. These numbers do not include biomass of all prey available to predators in each SHS.

Average Structural Diversity. The same SWAs used to calculate plant species diversity and the vegetation inventory data for those SWAs are divided into 4 vertical strata: 0-1 foot, 1-3 feet, 3-7 feet and over 7 feet. Plant diversity was calculated (Odum 1963) for each stratum and the index numbers of the strata were averaged for all four strata to obtain the numbers in this column.

Estimated Game Use of Standard Habitat Sites - Table 2-10

Production of Desirable and Intermediate Shrub Species by SHS. American Ag International, Inc. (1979) developed a table for each SHS which gives the percent of a range site in each SHS.

Example:

SHS - Mixed Shrub Mountains

Range Site No.	Range Site	% Comp. of SHS	No. Transects Analyzed
42-27-NTx	Igneous Hills and Mountains	56.1%	12
42-21-NTx	Limestone Hills	29.3%	6
42-24-NTx	Gravelly Sand	4.9%	1
42-35-NTx	Gravelly Loam	4.9%	1

Production data compiled for the vegetation analysis was sorted by vegetation type and percent range site to develop the estimates of production of desirable and intermediate shrub species. There are expected inaccuracies in the method used, but the data does provide for comparisons between SHS's.

Estimated Big Game per Section. Observation records from the inventory were totaled and calculated to percent of total by SHS. Using an estimated 1,500 deer and 500 pronghorn for the Planning Area, each percentage of the observations was calculated to number of animals for each SHS. The number of animals was divided by the number of sections in an SHS to derive the estimated animals per section.

For example: 1,500 deer. 45 observations in Pseudoriparian, of 268 total observations, or 16.79 percent of observations. Pseudoriparian = 43,270 acres or 67.6 sections. 1,500 x .1679 = 251.85. 251.85 ÷ 67.6 = 3.7 deer per section.

There are expected inaccuracies in this method because of observability differences between SHS's, location of roads, etc., but the method does provide data for comparison purposes.

Chapter 3

Impact predictions in Chapter 3 for the habitat types are based on comparisons of a group of SWAs within an SHS. The number of SHS's used in the comparisons are variable and in some cases, are too small a sample size for accurate data development. Comparisons were made by calculating diversity for all SWAs used for an SHS (Table 2-8) and then calculating diversity for those SWAs in poor, fair, and good ecological condition. The diversity index numbers were then compared to projected changes which may occur in and between SHS's.

Additional predictions are based on inventory information sorted to poor, fair, and good ecological condition class, as for dove and quail. Predictions for dove and quail are not provided numerically in Chapter 3 because the sample sizes were too small in various SHS's and condition classes. However, trends in dove and quail populations were noted and discussed in general terms.

C.A. #NMSO-41, 10/18/78

APPENDIX D-3

MASTER MEMORANDUM OF UNDERSTANDING
BETWEEN
THE NEW MEXICO DEPARTMENT OF GAME & FISH
AND
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

WHEREAS, under the laws of the State of New Mexico, the New Mexico Game Commission, hereinafter referred to as the Commission, is responsible for establishing broad policies and long-range programs for protection, propagation, restoration, transplanting, introducing and management of all wildlife as defined under New Mexico legislative statutes annotated in the 1953 compilation.

WHEREAS, the term, Department, as used herein, shall mean the New Mexico Department of Game & Fish, acting pursuant to and under the authority of the New Mexico Game Commission; and

WHEREAS, the Bureau of Land Management, hereinafter referred to as the Bureau, is responsible for the administration of large areas of public lands of the United States within New Mexico, hereinafter referred to as public lands; and

WHEREAS, the Bureau, under the laws of Congress and regulations of the Department of the Interior, is responsible for maintaining environmental conditions for optimum populations of wildlife on public lands, as determined through Bureau, Commission and Department planning procedures and compatible with other recognized uses of the lands and waters concerned; and

WHEREAS, the Sikes Act (88 Stat. 1369, 16 U.S.C., Sec. 670a (1976)) directs the Bureau to plan, develop, maintain and coordinate comprehensive conservation and rehabilitation programs for fish & wildlife in consultation and cooperation with State fish and wildlife agencies; and

WHEREAS, it is the mutual desire to the Commission and Department and the Bureau to work in harmony for the common purpose of maintaining, improving, and managing the wildlife resources and their habitat for the best interest of the people of New Mexico and the United States.

NOW, THEREFORE,

THE BUREAU AGREES:

1. That the State of New Mexico is responsible for the protection and propagation of wildlife on public lands that the Commission is recognized by the Bureau as the agency responsible for managing wildlife populations on public lands.

2. To make available to the Department such Bureau improvements, facilities and transportation media, as may be needed by the employees of the Department in connection with the administration of joint wildlife programs, provided that the extent of such services is consistent with Bureau needs and regulations and funds available, and services appropriately coordinated.

3. To authorize, under appropriate agreement or easement, the erection and maintenance of structures needed to facilitate wildlife management activities of the Department on the public lands, provided such structures are consistent with Bureau management programs and that all moveable structures, facilities, and equipment placed on public lands by the Department under authorization from the Bureau shall remain the property of the State and may be removed by it at any time under the terms thereof.

4. To assist the Department on the enforcement of laws by reporting violations, or suspected violations, to Departmental personnel.

5. To assist the Department, when requested, in wildlife population or condition surveys, insofar as is consistent with regularly assigned duties of Bureau personnel.

6. Consult with the Department on any actions affecting wildlife habitat through construction of projects and/or vegetal control projects and request recommendations from the Department to aid the Bureau in making an environmental assessment prior to initiating the action.

7. To provide the Department with advance notice of proposed classification of lands for disposal, withdrawal or exchange and where wildlife and related recreational values are involved to consult with the Department relative to reservations to ensure preservation of wildlife values, public access and usage including public easements to public lands.

8. To provide the Department for review, all planning documents and correspondence pertinent to management of wildlife habitat on the public lands and public meetings involving the Bureau's planning system. Review comments are to be submitted as written recommendations.

9. To evaluate habitat conditions on big game browse ranges through the use of the Big Game Browse Range Analysis Technique, an interagency study procedure. Data collected will be available to cooperators as field work is accomplished. Areas of cooperative work will be mutually determined annually.

10. To cooperatively develop conservation programs for State listed endangered or sensitive animals that would prevent the destruction or adverse modification of their habitats as appropriate to State laws.

11. Through multiple-use resource management of the public lands to give full consideration to wildlife as one of the desirable resources.

THE DEPARTMENT AGREES:

1. To recognize the Bureau as the agency responsible for managing habitat, including wildlife habitat, on public lands.

2. To make available to representatives of the Bureau such Department improvements, facilities, and transportation media, as may be needed by the employees of the Bureau in connection with the administration of joint wildlife programs, provided that the extent of such service is consistent with Department needs and regulations and funds available, and services appropriately coordinated.

3. To regulate wildlife so that wildlife habitat on public land will be maintained in a high state of productivity and within the carrying capacities established on the public lands.

4. To create no game preserves, refuges, or sanctuaries on the public lands without Bureau approval.

5. To notify the State Director promptly of emergency changes in State Game and Fish regulations affecting the public lands.

6. To erect no signs or structures and perform no construction on the public lands without first securing an appropriate agreement or easement from the Bureau.

7. To enter into agreement with the Bureau relative to the disposition of the public land grazing preference attached to base property acquired by the Commission.

8. To provide assistance to the Bureau as requested in its environmental assessment of range improvement projects, reviewing of planning documents, and other programs or actions directly affecting wildlife populations and habitats. Review comments are to be submitted in the form of written recommendations.

9. To provide the Bureau with reports and correspondence pertinent to management of wildlife, including threatened and endangered species on the public lands.

10. To provide planning assistance to the Bureau's planning program in the form of data pertaining to wildlife species population estimates, present and optimum numbers, critical habitat areas, occupied ranges, etc., and to submit comments concerning Bureau program's effects on wildlife populations and habitat.

11. To advise the State Director of the Department's finalized recommendations proposals and all amendments for the hunting seasons (all game species) as to dates, bag limits, special hunt areas, etc., and other (pertinent) matters, when recommendations are submitted. This advisement would follow the Department's regional meetings requesting recommendations from land management agencies.

DEPARTMENT AND THE BUREAU MUTUALLY AGREE:

1. To meet jointly at least annually to discuss matters relating to the management of wildlife and habitat on or affecting the public lands, and to provide for other meetings at various administrative levels as necessary.

2. To cooperate in the identification of the public lands having wildlife values, as determined by the Department and the Bureau, and in the formulation and execution of comprehensive plans or programs for the management of wildlife resources on the public lands and by revisions as needed to keep such plans or programs current.

3. To cooperate in the inventory, cooperative research, and management study of wildlife and wildlife habitat relationships on or adjacent to public lands, as necessary to ensure the welfare and proper management of the species and its habitat.

4. To cooperate in the restoration, harvesting, and general management of the wildlife resources of the State of New Mexico consistent with the multiple land use program.

5. To encourage a united and professional approach by personnel of both agencies in seeking solutions to problems which may arise in wildlife management programs. All major complaints, constructive criticisms, and suggestions shall be submitted to appropriate supervisory personnel. In the event of disagreement or conflict with established policy or administrative procedure, the matter shall be directed through proper channels to the Director of the Game and Fish Department and the State Director of the Bureau for decision or reconciliation.

6. To jointly consider plans for proposed transplants and introduction programs of wildlife which would occupy habitats on public lands. No new programs for wildlife introductions will be started on public land without the Bureau's approval.

7. To cooperate in the development of construction of wildlife habitat improvements.

8. To cooperate in resolving problems relating to public fishing and hunting access on and to public lands.

9. To exchange copies, where appropriate, of programs, objectives and studies relating to wildlife.

APPENDIX D-3 (concluded)

10. That whenever a specific area under Bureau administration or an intensive cooperative wildlife management program requires preferential management considerations, as identified through the Bureau's Management Framework Plan, and agreed to by the Department, these areas will be delineated and management plans developed with specific responsibilities of either party developed as needed.

11. To implement the Statewide Wildlife Comprehensive Plan. A specific annual Sikes Act work schedule will be developed for each forthcoming fiscal year to define specific on-site accomplishments, estimated costs, and habitat management plan schedules and priorities. A meeting will be scheduled at the State level during the month of June each year.

12. That it is expressly stipulated and agreed by both parties that each and every provision in this master cooperative agreement is subject to the laws of the State of New Mexico, the laws of the United States, and to the delegated authority assigned in each instance.

13. That nothing in this agreement shall be construed as obligating either party hereto in the expenditure of funds, or for the future payment of money, in excess of appropriations authorized by law.

14. That no member of, or delegate to Congress, or State Legislator or resident commissioners, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom.

15. To accomplish all cooperative work under the provisions of this master Memorandum of Understanding or supplemental cooperative agreements without discrimination against any employee, or applicant for employment because of race, creed, color, sex or national origin.

16. That this Memorandum of Understanding shall become effective when signed by the designated representatives of the parties hereto and shall remain in force until 1985 or until terminated by mutual agreement, or by either party upon thirty days notice in writing to the other of its intention to terminate upon a date indicated.

Amendments to this agreement may be proposed by either party and shall be incorporated within the appropriate section of this Memorandum of Understanding and not as a supplement or separate agreement and shall become effective upon approval by both parties.

NEW MEXICO DEPARTMENT OF GAME & FISH

By /s/ Harold F. Olson   Date: 10/11/78
Director

BUREAU OF LAND MANAGEMENT, U.S.
DEPARTMENT OF THE INTERIOR

By /s/ Arthur W. Zimmerman   Date: October 11, 1978
State Director, New Mexico

By /s/ R. Buffington   Date: 10-18-78
State Director, Arizona

APPENDIX D-4

Correspondence Concerning Section 7 Consultation With the U. S. Fish and Wildlife Service

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

IN REPLY REFER TO
6840 (931)
x1792

DEC 4 1980

Memorandum

To: Regional Director, USF&WS, Albuquerque, New Mexico

From: Associate State Director, BLM, Santa Fe, New Mexico

Subject: Southern Rio Grande Grazing Environmental Impact Statement - List Request

The Bureau of Land Management (BLM), in meeting the mandates of the Federal Land Policy and Management Act (FLPMA) of 1976 and the National Environmental Policy Act (NEPA) of 1970 as amended, is preparing a Grazing Environmental Impact Statement (EIS) for the Southern Rio Grande Planning Area - Las Cruces District (map enclosed).

Pursuant to Section 7 of the Endangered Species Act of 1973 (as amended), we are hereby requesting a formal list of species proposed or listed as threatened or endangered which potentially occupy this planning area.

An abstract describing the alternatives including the proposed action is enclosed. Any questions regarding this request should be addressed to our Endangered Species Liaison Officer Andy Dimas at FTS 476-1231.

Marvin LeNoue

Acting

Separate Cover: Abstract

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

December 15, 1980

MEMORANDUM

TO : State Director, Bureau of Land Management, P.O. Box 1449,
Santa Fe, New Mexico 87501

Acting

FROM : Regional Director, Region 2 (SE)

SUBJECT: Southern Rio Grande Grazing Environmental Impact Statement -
List Request

This is in reply to your memorandum of December 4, 1980, which requested information about species which are listed or proposed to be listed as threatened or endangered, as provided by the Endangered Species Act. Your area of interest is the subject EIS and associated areas in Dona Ana, Luna, Grant, and Sierra Counties, New Mexico.

As provided by Section 7(c)(1) of the Endangered Species Act, the Fish and Wildlife Service is required to furnish a list of those species, both proposed and listed, that may be affected by Federal construction activities.

Upon receipt of the Fish and Wildlife Service's species list, the Federal agency authorizing, funding or carrying out the construction action is required to conduct a biological assessment for the purpose of identifying listed and proposed species which are likely to be affected by such action.

The biological assessment shall be completed within 180 days after receipt of the species list, unless it is mutually agreed to extend this period. If the assessment is not initiated within 90 days after receipt of the species list, I suggest its accuracy be verified before conducting the assessment.

Biological assessments should include as a minimum:

1) an on-site inspection of the area affected by the proposed activity or program, which may include a detailed survey of the area to determine if species are present and whether suitable habitat exists for either expanding the existing population or potential reintroductions of populations;

2) interview recognized experts on the species at issue, including the Fish and Wildlife Service, State conservation departments, universities, and others who may have data not yet found in scientific literature;

3) review literature and other scientific data to determine the species distribution, habitat needs, and other biological requirements;

4) review and analyze the effects of the proposal on the species, in terms of individuals and populations, including consideration of the cumulative effects of the proposal on the species and its habitat;

5) analyze alternative actions that may provide conservation actions;

6) other relevant information;

7) report documenting the assessment results.

For purposes of providing interim guidance, the Fish and Wildlife Service considers construction projects to be any major Federal action authorized, funded or carried out by a Federal agency which significantly affects the quality of the human environment and which is designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like.

If the biological assessment indicates the proposed project may affect listed species, the formal consultation process shall be initiated by writing to the Regional Director, Region 2, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103. If no effect is evident, there is no need for further consultation. I would, however, appreciate the opportunity to review your biological assessment.

In addition, the Act (Sec. 7(c)(1)) now requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed as endangered or threatened or adversely modify critical habitat proposed to be designated for such species. The purpose of this requirement is to identify and resolve at the early planning stage of an action, all potential conflicts between the action and the respective species and critical habitat. The informal consultation process can accomplish this requirement.

The attached sheet provides information on listed species which may occur in the area of interest. If you have need of further assistance, please call the Endangered Species Office at (505) 766-3972 or FTS 474-3972.

Gordon H Hansen

Attachments

cc: Field Supervisor, Albuquerque Field Office (ES), Albuquerque, NM
Area Manager, Phoenix Area Office (SE), Phoenix, AZ

Southern Rio Grande Grazing EIS

LISTED SPECIES

The black-footed ferret (Mustela nigripes) - occurs in grassland plains and surrounding mountain basins to 10,500 feet elevation and usually is found in association with prairie dog towns.

The American peregrine falcon (Falco peregrinus anatum) - occupies habitats with rocky, steep cliffs preferably near water where avian prey concentrations are high. They also are found in forests and grasslands.

The Gray's Lake population of whooping cranes (Grus americana) - overwinter in the middle Rio Grande Valley.

The Socorro isopod (Exosphaeroma thermophilus) - is found near Sedillo Spring west of Socorro, New Mexico.

PROPOSED SPECIES

The Chihuahuan chub (Gila nigrescens) - is found only in the Mimbres River.

CRITICAL HABITAT

None.

OPTIONAL FORM NO. 10
JULY 1973 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

1792

Memorandum

TO : Ed Webb, EIS Team Leader

DATE: January 16, 1981

FROM : Kenneth E. Holmes, Wildlife Mgt. Spec.

SUBJECT: SRG Grazing Environmental Impact Statement - List Request

I contacted Mr. Dave Bowman, FWS, Albuquerque, concerning T/E species on the recent list. The NMSO memo transmitting the list to use stated that Dave Bowman added Echinocereus lloydii to the list after receipt of the list in NMSO.

Species discussed were the Socorro isopod (Exosphaeroma thermophilus), bald eagle (Haliaeetus leucocephalus), and Corypantha sneedii sneedii. Mr. Bowman stated that the Socorro isopod should be removed from the list, Corypantha sneedii sneedii added to the list, and that the bald eagle, although verified as occurring in the Planning Area need not be considered.

5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

APPENDIX E
LIVESTOCK GRAZING

APPENDIX E-1

PRESENT ECOLOGICAL CONDITION CLASS BY ALLOTMENT

The following appendix shows the percent federal acres in good, fair, and poor ecological condition by planning unit and allotment as derived from the SVIM data.

APPENDIX E-1 (cont'd)
LAS UVAS PLANNING UNIT

Allotment	Federal Acres	Waste (Acres)	Ecological Condition Class % Good	% Fair	% Poor
2001	2,593		0	6	94
2002	5,471		0	5.2	94.87
2031	3,506	20	0	33.4	66.6
2051	12,183		0	87.6	12.4
3001	18,470		0	0	100
3002	24,236		0	0	100
3003	22,404		0	0	100
3004	1,014		0	0	100
3006	85		0	75.3	24.7
3007	1,737		0	100	0
3008	10,931		0	8.4	91.5
3009	27,418	9	0	40.2	59.8
3010	3,472		3.2	87.9	8.9
3011	3,017		0	45.8	54.2
3012	6,706		2.2	64.1	33.7
3013	129,317		0	55.4	44.6
3014	3,706		0	34.1	65.9
3015	22,622		1.3	84.2	14.5
3016	90,599	879	0.4	3.2	96.4
3018	3,733		0	85	15
3019	3,854	20	0	14.4	85.5
3020	68,255		0	2.4	97.6
3022	46,318		0	0	100
3023	87,273		0	4.4	95.6
3024	27,960		0	74.2	25.8
3025	2,670	35	0	61.9	38.1
3026	3,075		0.2	58.9	40.8
3027	3,323		0	56.1	43.9
3028	22,982		.4	52.4	47.1
3029	5,452		0	20.1	79.9
3031	16,532		0	78.2	21.8
3032	13,848		0	95.1	4.9
3033	76,137		0	1	99
3034	1,717		0	11.6	88.4
3035	143		0	0	100
3036	6,937		0	57.1	42.9
3037	814		0	39.3	60.7
3038	27,897		0	0	100
3039	51,911	1,000	28.3	3.7	68.1
3040	9,092		0	58.9	41.1
3041	2,071		0	0	100
3042	43		0	0	100
3043	2,458		3.6	72.2	24.2
3044	8,845		0	0	100
3045	4,264		0	0	100
3046	10,391		0	39.4	60.6
3047	14,919		57.6	24.3	11.6
3048	6,529		0	0	100
3052	113,158		0.3	18.4	81.3
Subtotal	1,032,108	1,963			

LAS UVAS PLANNING UNIT

Allotment	Federal Acres	Waste (Acres)	% Good	% Fair	% Poor
*3005	4,608		0	21.3	78.6
*3049	3,509		0	0	100
*3050	1,142		0	0	100
*3051	610		0	0	100
Subtotal Unallotted	9,869				
ORGAN PLANNING UNIT					
5001	17,368		0	37.9	62.1
5002	14,972		0	59.6	40.4
5003	4,985		0	52.9	47.1
5004	8,639		0	0	100
5006	1,110		0	13.6	86.4
5007	23,514		4.5	42.6	52.9
5008	4,207		0	18.7	81.3
5009	31,311	146	0	29.6	70.4
5010	3,048		0	0	100
5012	1,243		0	40.7	51.3
5013	10,850		0	2.1	97.9
Subtotal	121,247	146			
*5014	8,997	281	0	56.3	43.6
*5015	273		0	0	100
*5016	640		0	0	100
Subtotal Unallotted	9,910	281			
CABALLO PLANNING UNIT					
6001	4,354		0	5.6	94.4
6002	19,046		0	10.3	89.7
6003	2,723		0	23	77
6004	9,758		0	67.3	32.7
6005	1,854		0	75.8	24.2
6006	2,959		0	69.8	30.2
6007	4,998		0	0	100
6008	1,436		0	100	0
6009	1,703		0	48.7	51.3
6010	2,796		4	80.5	15.5
6011	109		0	94.5	5.5
6012	3,876		0	61	39
6013	120		0	100	0
6014	549		100	0	0
6015	118		0	43.2	56.7
6016	6,931		0	2.2	97.8
6017	30,263		0	20.4	79.6
6018	25,982		0	37.2	62.8
6019	25,731		0	3.7	96.3

APPENDIX E-1 (cont'd)
CABALLO PLANNING UNIT

Allotment	Federal Acres	Waste (Acres)	% Good	% Fair	% Poor
6020	38,122		0.7	9.9	89.4
6021	36,991		0.6	7.5	91.9
6022	47,046		0	25.9	74.1
6023	15,619		0	60.1	39.9
6024	12,041		0	90.8	9.2
6025	440		0	69.5	30.5
6026	2,465		0	61.5	38.5
6027	3,944		0	22.7	77.3
6028	777		0	54.7	45.3
6029	270		13.3	86.7	0
6030	1,950		0	54	46
6031	637		87.5	12.4	0
6032	11,219		0	.1	99.9
6033	4,710		12	80.9	7
6034	1,006		0	100	
6035	6,981		0	20.6	79.3
6037	2,769		.2	97.5	2.1
6038	742		0	39.4	60.5
6039	1,945		0	25.2	74.7
6040	2,387		24.9	70.1	4.9
6041	14,664		0	67.7	32.2
6042	3,345	52	0	1.8	98.1
6043	7,346		0	52.6	47.3
6044	16,482		0	17.2	82.7
6045	3,110		0	85.4	14.5
6046	6,666		0	78.5	21.4
6047	1,829		0	100	0
6048	8,462		0	56	43.9
6049	17,316		0	87	12.9
6050	9,980		0	34.2	65.7
6053	81,225		.1	34.6	65.3
6054	4,556		.3	44.4	55.2
6055	2,664		0	50	49.9
6056	21,474		0	11.2	88.7
6057	21,524		.1	57.1	42.7
6058	4,219		0	90.4	9.5
6059	8,864		0	22.2	77.7
6060	399		0	0	100
6061	487		0	70	29.9
6062	29,257		0	1.8	98.1
6063	3,132		0	34.3	65.6
6064	6,849	160	0	21.4	78.5
6065	4,653		0	7	92.9
6066	2,835		0	7.6	92.3
6067	22,200		0	49.5	50.4
6068	5,105		0	54	46
6069	3,398		0	3.9	96.1
6070	1,018		0	96.5	3.5

APPENDIX E-1 (cont'd)
CABALLO PLANNING UNIT

Allotment	Federal Acres	Waste (Acres)	% Good	% Fair	% Poor
6071	360		0	0	100
6072	5,867		4.1	56.1	39.9
6073	434		0	17.1	82.9
6074	30,293	61	0	82.5	17.5
6075	4,663		0	63.5	36.4
6076	504		0	94.6	5.4
6077	962		0	57.4	42.6
6078	474		0	100	0
6079	5,669	31	0	43.2	56.8
6080	30,263		1.9	57.8	40.3
6081	6,327		0	9.3	90.8
6082	9,855		1.6	79.8	18.6
6083	5,962		0	20.1	79.9
6084	39,977		0	27.5	72.5
6085	7,364		0	73.3	26.7
6086	1,152		0	66.3	33.7
6087	2,700		0	95	5
6088	183	18	0	0	100
6089	8,744		0	73.1	26.9
6090	3,041		0	8.6	91.4
6091	5,691		0	0	100
6093	1,765		0	41.4	58.6
6094	2,801		0	66.7	33.3
6095	647		0	21.8	78.2
6096	2,016		0	25.4	74.6
6097	540		100	0	0
6098	796		0	43.2	56.8
6099	643		0	43.2	56.8
6100	436		0	36.9	63.1
6101	1,154		0	10.6	89.4
6102	2,885		0	61	39
6103	1,538		0	75.1	24.9
6104	316		0	48.4	51.6
6105	1,168		0	2.9	97.1
6106	665		71.7	27.5	.8
6108	4,479		0	12.4	87.6
6109	1,836		0	0	100
6110	31,892		0	68.2	31.8
6111	426		0	100	0
6112	160		0	0	100
6113	6,537		0	9.7	90.3
6114	4,295		0	96.3	3.7
6115	591		40.8	0	59.2
6116	2,295		0	49.6	50.4
6117	6,031		9.4	69.8	20.8
6119	40		0	0	100
6120	80		0	100	0
6121	141		0	100	0

APPENDIX E-1 (cont'd)
CABALLO PLANNING UNIT

Allotment	Federal Acres	Waste (Acres)	% Good	% Fair	% Poor
6122	80		0	50	50
6123	680		0	100	0
6124	2,484		0	64.4	35.6
6125	80		0	3.8	96.3
6126	160		0	75	25
6127	586		0	39.4	60.6
6128	2,381		0	0	100
6129	1,138		0	0	100
6130	367		0	100	0
6131	1,324		3.5	0	96.5
6132	1,403		0	35.8	64.1
6133	158		0	0	100
6134	1,579		0	58.1	41.9
6135	923		0	100	0
6136	5,394		0	9.2	90.7
6137	87		0	0	100
6138	440		100	0	0
6140	1,417		0	95.7	4.2
6141	7,210		0	45.1	54.9
6142	480		0	20.4	79.6
6144	1,592		0	18	82
6145	11,148		0	48.4	51.6
6146	23,641		0	.8	99.2
Subtotal	961,836	322			
*6139	7,304		4.6	36	59.3
*6143	1,068		0	0	100
Subtotal Unallotted	8,372				
ALLOTTED					
Las Uvas PU	1,032,088	1,963			
Organ PU	121,247	146			
Caballo PU	961,836	322			
TOTALS for PA	2,115,171	2,431			
UNALLOTTED					
Las Uvas PU	9,869				
Organ PU	9,910	281			
Caballo PU	8,372				
TOTALS for PA	28,151	281			
	2,143,322	2,712			

Grand Total (2,146,034)

APPENDIX E-1 (concluded)

Total Acres - Condition Class (2,146,034)

	Good	Fair	Poor
Allotted	31,978 (1.5%)	644,409 (30.4%)	1,438,784 (68%)
Unallotted	340	15,938	11,873
Waste			2,712

Source: BLM Las Cruces District Office EIS Files, 1980.

APPENDIX E-2

ACREAGE AND FORAGE ALLOCATION BY ALLOTMENT

(Las Uvas Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
2001	Anderson, W. T.	2,593	533	3,126	156	0	156	156	156	0	0	159	0
2002	Sidney Savage	5,471	8,415	13,886	516	19	432	430	430	0	-2	431	0
2031	Johnson, Oennis	3,526	11,710	15,236	1,248	0	450	451	451	0	+1	380	0
2051	Nunn, Ed. W. Jr.	12,183	8,385	20,568	4,164	0	2,616	2,296	2,296	0	-320	2,942	0
3001	Steed, Wendal	18,470	2,360	20,830	1,440	0	1,308	1,086	1,086	0	-222	1,100	0
3002	Arrington, Jack	24,236	1,669	25,905	1,632	36	1,500	1,410	1,410	0	-90	2,031	0
3003	Hay, James O.	22,404	2,806	25,210	1,752	0	1,584	892[b/]	892	0	-692	1,518	0
3004	Bailey, H. N.	1,014	157	1,171	120	0	96	66[a/]	66	0	-30	33	0
3006	Bowden, Hugh V.	85	90	175	12	0	12	12[b/]	12	0	0	5	0
3007	Brewster, Charles C.	1,737	909	2,646	276	0	192	186	186	2	-6	172	3
3008	Burke, Francis and Mary M.	10,931	5,750	16,681	1,428	0	1,020	353	353	0	-667	992	0
3009	Burris, G. W.	27,427	31,017	58,444	6,708	96	3,936	3,890	3,890	0	-46	3,961	0
3010	Bustamante, Juan	3,472	1,272	4,744	300	12	252	252	252	2	0	364	5
3011	Castle, W. N.	3,017	1,744	4,761	624	0	372	188	188	4	-184	414	8
3012	Hille, Roderick	6,706	1,568	8,274	1,800	0	1,380	1,387	1,387	8	+7	1,362	16
3013*	Corralitos Venture	129,317	53,605	182,922	19,800	0	13,860	12,188	12,188	0	-1,672	13,928	0
3014	Cothern, Howard	3,706	765	4,471	336	0	252	252	252	2	0	209	5
3015*	Cothern, Wilford	22,622	4,733	27,355	5,344	96	4,497	4,433	4,433	16	-64	4,645	35
3016	Thompson & Herrmann	91,478	25,575	117,053	10,452	0	6,460	6,468[d/]	6,468	25	+8	6,248	46
3018	Hurt Cattle Co.	3,733	2,125	5,858	636	0	456	414	414	2	-42	465	5
3019	Camilu-Vig Inc.	3,874	10,054	13,928	1,272	0	384	384	384	0	0	875	0
3020	Strauss, Gerald A.	68,255	9,209	77,464	5,280	0	4,608	2,716[b/]	2,716	2	-1,892	3,979	4
3022	Strauss, Gerald A.	46,318	9,074	55,392	3,120	0	2,688	1,660[b/]	1,660	0	-1,028	2,370	0
3023	Wagner, Jack	87,273	8,441	95,714	6,242	60	5,760	4,464	4,464	2	-1,296	5,259	3
3024*	Goodsight Inc.	27,960	22,024	49,984	12,204	36	6,012	5,871	5,871	0	-141	6,518	0
3025	Gray, Lois Ellen	2,705	2,532	5,237	636	0	360	362	362	2	+2	221	3
3026*	Horner, L. A. Estate	3,075	101	3,176	300	12	288	284	284	2	-4	284	4
3027	Smith, O. L.	3,323	1,101	4,424	672	0	564	459	459	2	-105	216	3
3028	Hyatt and Hyatt	22,982	11,910	34,892	5,688	48	3,780	2,999[d/]	2,999	0	-781	5,214	0
3029	Strauss, Gerald	5,452	4,220	9,672	612	0	324	227[e/]	227	0	-97	338	0

APPENDIX E-2 (cont'd)

(Las Uvas Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Prefer-ence (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
3031	Las Uvas Ranch	16,532	12,865	29,397	5,940	5	3,089	3,089	3,089	18	0	4,518	40
3032*	Martin, Guy (Saddle Mtn Ranch)	13,848	4,949	18,797	3,624	192	2,664	2,376	2,376	8	-288	3,015	17
3033	Cooper, Thomas	76,137	6,661	82,798	5,856	96	5,448	4,074	4,074	16	-1,374	4,916	29
3034	Mundy and Morrow Inc.	1,717	251	1,968	144	0	120	82	82	1	-38	108	2
3035	McCulloch and Shiflett	143	29	172	36	0	36	22	22	0	-14	21	0
3036	Nix, Betty	6,937	640	7,577	1,200	12	1,080	987	987	0	-93	1,834	0
3037	Nunn, Edward W., Jr.	814	3,205	4,019	144	0	144	144	144	0	0	198	0
3038	Nunn, Leo & Dorothy	27,897	8,093	35,990	3,864	0	2,844	1,087	1,087	0	-1,757	4,717	0
3039	Thousand Springs Cattle Co.	52,911	13,118	66,029	7,332	0	5,508	4,903	4,903	2	-605	4,245	3
3040	Rasmussen, Mogens I	9,092	1,197	10,289	1,320	12	636	406	406	0	-230	1,639	0
3041	Evans, Bobby G.	2,071	1,904	3,975	204	0	192	194	194	0	+2	143	0
3042	Konyn, Frank J.	43	103	146	12	0	12	12	12	0	0	8	0
3043	Johnson, 8uster	2,458	28	2,486	300	12	300	260	260	3	-40	281	6
3044	Arrington, Jack	8,845	2,183	11,028	528	0	408	379	379	0	-29	932	0
3045	Whitaker, B. F.	4,264	608	4,872	270	12	204	69[b/]	69	0	-135	193	0
3046	Wilson, James A. Est.	10,391	1,315	11,706	731	0	717	572	572	0	-145	688	0
3047	Four-S, Inc.	14,919	2,529	17,448	1,848	12	1,700	1,245	1,245	0	-455	1,813	0
3048	White, John T. and Johnson, Arthur G.	6,529	639	7,168	444	24	420	316	316	0	-104	497	0
3052	International Cattle Systems	113,158	33,101	146,259	12,108	216	9,240	6,427	6,427	10	-2,813	8,981	19
	SUBTOTALS	1,034,051	337,272	1,371,323	140,675	1,008	100,361	82,880	82,880	129	-17,481	105,380	256

APPENDIX E-2 (cont'd)

(Organ Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
5001	Blythe, W. F.	17,368	12,530	29,898	1,486	0	1,024	1,025	1,025	0	+1	992	0
5002	Cox, A. B. Estate	14,972	10,532	25,504	2,952	48	1,504	925	925	44	-579	1,262	95
5003	San Augustine Ranch, Inc.	4,985	4,707	9,692	1,200	0	624	624	624	352	0	827	773
5004	Blythe, W. F.	8,639	1,231	9,870	492	0	492	436[c]	436	0	-56	484	0
5006	Hopkins, Dale	1,110	679	1,789	312	0	275	173	173	21	-102	206	45
5007	Isaacks, Jeff	23,514	26,125	49,639	3,528	0	1,920	1,116	1,116	0	-804	1,902	0
5008	Isaacks, R. L.	4,207	284	4,491	414	0	396	396	396	0	0	304	0
5009	Price, Paul W.	31,457	6,944	38,401	2,016	36	1,593	468	468	265	-1,125	1,643	582
5010	Price's Otero Invest.	3,048	10,056	13,104	396	0	191	180	180	0	-11	185	0
5012	Walter, S. A.	1,243	2,075	3,318	396	12	168	151	151	10	-17	143	21
5013	Four-S, Inc.	10,850	1,114	11,964	1,500	12	1,428	1,264	1,264	55	-164	884	120
	SUBTOTALS	121,393	76,277	197,670	14,692	108	9,615	6,758	6,758	747	-2,857	8,832	1,636

(Caballo Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
6001	Adams, Max S.	4,354	600	4,954	648	12	600	596	596	16	-4	248	18
6002	Muncy, Bobby W.	19,046	1,087	20,133	1,164	12	1,044	1,189	1,189	0	+145	1,713	0
6003	Apodaca, Raymundo	2,723	0	2,723	228	12	228	51	51	0	-177	136	0
6004	Zelfa Apodaca Estate	9,758	6,209	15,967	2,220	24	1,260	1,262	1,262	0	+2	769	0
6005	Zelfa Apodaca Estate	1,854	0	1,854	372	0	372	372	372	0	0	618	0
6006	Armijo Community Allotment	2,959	2,536	5,495	408	0	408	408	408	0	0	279	0
6007	Baca, Barbarita	4,998	160	5,158	864	0	828	832	832	7	+4	783	19
6008	Bason & Cox, Inc.	1,436	0	1,436	372	0	372	372	372	8	0	245	51
6009	Beck, Allan and Margaret	1,703	0	1,703	504	0	504	504	504	3	0	492	5
6010	Beck, Allan and Margaret	2,796	639	3,435	420	0	420	420	420	6	0	470	10
6011	Bierner, Charles Jr.	109	57	166	84	0	36	36	36	0	0	18	0
6012	Bourguet & Sullivan	3,876	1,080	4,956	624	12	444	399	399	7	-45	359	14
6013	Booth, Blanche	120	0	120	24	0	24	24	24	0	0	24	0
6014	Richardson, Robert E.	549	1,167	1,716	132	0	132	92	92	0	-40	84	0
6015	Boykin, S. J.	118	1,653	1,771	12	0	12	12	12	0	0	14	0

APPENDIX E-2 (cont'd)

(Caballo Planning Unit)

					Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)			Projected Goal by Year 2010 (AUMs)	
Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game	Changes from Preference (AUMs)	Livestock	Big Game
6016	Brewster, Donald	6,931	586	7,517	444	0	444	270	270	9	-174	217	11
6017	Buckhorn Ranch	30,263	5,295	35,558	4,620	72	3,708	3,696	3,696	23	-12	3,738	64
6018*	Caballo Mtn Ranch	25,982	8,462	34,444	3,300	60	2,460	2,395	2,395	46	-65	2,453	53
6019	Cain Brothers & Co.	25,731	4,260	29,991	2,040	36	1,800	1,753	1,753	21	-47	1,476	60
6020	Cain, Ben	38,122	16,473	54,595	8,916	36	4,716	3,481	3,481	23	-1,235	2,541	50
6021*	Jack M. Cain Limited Partnership	36,991	28,184	65,175	6,360	60	2,772	1,981	1,981	16	-791	2,705	45
6022	Cain, Lewis	47,046	16,713	63,759	8,856	48	5,532	3,810	3,810	10	-1,722	4,436	40
6023	Castle, W. N.	15,619	3,925	19,544	1,044	0	756	306	306	31	-450	689	36
6024*	Castle, W. N. & J. A.	12,041	1,461	13,502	876	0	828	396	396	11	-432	827	12
6025	Chastain, Forrest D.	440	909	1,349	180	0	36	28	28	0	-8	32	0
6026	Chatfield, Harvey	2,465	1,593	4,058	577	6	314	286	286	0	-28	216	0
6027	Chavez, Alberto &	3,944	3,583	7,527	852	12	408	411	411	0	+3	352	0
6028	Chavez, et al.	777	0	777	204	0	204	204	204	0	0	172	0
6029	Chavez, John J.	270	708	978	36	0	36	36	36	0	0	104	0
6030	Chavez, Issac N.	1,950	553	2,503	384	12	288	228	228	7	-60	137	14
6031	Chavez, Lorenzo	637	572	1,209	264	0	144	144	144	0	0	140	0
6032	Cluff, O. Leath	11,219	3,111	14,330	1,628	31	1,354	1,029	1,029	14	-325	909	60
6033	Cox, Jay W.	4,710	2,839	7,549	3,816	24	1,092	977	977	12	-115	1,032	72
6034	Adams Ranch Inc.	1,006	40	1,046	120	10	120	120	120	0	0	346	0
6035	Ward, E. J.	6,981	165	7,146	504	16	504	504	504	0	0	501	0
6037	Cunningham, Vernon	2,769	1,729	4,498	2,732	22	576	573	573	20	-3	720	62
6038	Dawson, Oliver B.	742	574	1,316	96	0	60	60	60	0	0	36	0
6039	Dayberry, Ralph T.	1,945	184	2,129	408	12	348	347	347	0	-1	418	0
6040	Diamond A Cattle Co.	2,387	11,414	13,801	552	0	552	552	552	0	0	500	0
6041	A Spear Ranch % Marshall Doolittle	14,664	7,107	21,771	2,561	45	1,716	1,635	1,635	0	-81	1,226	0
6042	Elkins, Chandler	3,397	736	4,133	264	0	216	225	225	0	+9	135	0
6043	Franzoy Cattle Co.	7,346	8,448	15,794	3,456	36	1,644	1,647	1,647	13	+3	1,611	22
6044*	Rainwater, Ralph H.	16,482	13,784	30,266	2,577	8	2,160	1,566	1,566	3	-594	2,014	13
6045	Gonzales, Barry	3,110	1,765	4,875	576	0	216	162	162	0	-54	209	0

APPENDIX E-2 (cont'd)

(Caballo Planning Unit)

					Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Prefer-ence	Projected Goal by Year 2010 (AUMs)	
Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game	(AUMs)	Livestock	Big Game
6046	Gonzales Community Allotment	6,666	419	7,085	264	0	253	29	29	0	-224	248	0
6046	Gonzales, Tony, Reynaldo, & Barry				660	0	152	126	126	0	-26	150	0
6047	Jones, William B.	1,829	29	1,858	216	2	216	199	199	0	-17	170	0
6048	Gordon, Donald R.	8,462	1,877	10,339	1,320	0	1,104	792	792	0	-312	690	0
6049	Caballo Grazing Cooperative Assn.	17,316	3,372	20,688	2,659	50	2,435	2,435	2,435	21	0	2,364	24
6050	Chatfield, Harvey	9,980	4,282	14,262	1,390	43	1,075	1,050	1,050	0	-25	611	0
6053	Graham, Neil O.	81,225	16,190	97,415	7,236	120	6,372	6,230	6,230	64	-142	8,065	106
6054	Greer, G. S.	4,556	2,445	7,001	504	0	312	313	313	0	+1	311	0
6055	Greer, G. S.	2,664	2,059	4,723	428	0	228	228	228	0	0	160	0
6056	Greer, G. S.	21,474	7,388	28,862	3,533	48	2,532	2,464	2,464	2	-68	2,493	6
6057	Hackey, Ralph	21,524	18,124	39,648	6,948	0	3,384	3,400	3,400	0	+16	3,359	0
6058	Ashbaugh, Emory	4,219	297	4,516	746	55	720	696	696	0	-24	357	0
6059	C-N-H Cattle Co.	8,864	2,285	11,149	1,800	24	1,428	1,313	1,313	0	-115	1,624	0
6060	Hatley, Darrell A.	399	0	399	1,440	0	1,382	1,227	1,227	0	-155	164	0
6061	Hayner, Robert S. Est.	487	280	767	36	0	36	36	36	0	0	45	0
6062	Hille, A. R. and Maxine	29,257	2,554	31,811	3,456	0	3,168	3,179	3,179	6	+11	2,142	17
6063	Holden, Howard Lee	3,132	695	3,827	444	12	384	202	202	0	-182	183	0
6064	Hopkins, Velma (Indiv.)	7,009	307	7,316	540	0	516	519	519	0	+3	519	0
6065	Hopkins, Velma (Rollins Comm.)	4,653	4,718	9,371	804	12	384	382	382	0	-2	404	0
6066	Hubble, Ellsworth E.	2,835	1,735	4,570	360	0	252	244	244	0	-8	164	0
6067	Hurt, James W.	22,200	4,835	27,035	3,264	0	2,664	2,260	2,260	227	-404	2,397	263
6068	Greer, G. S. Calhourn Comm. Allot.	5,105	2,625	7,730	1,021	16	721	727	727	0	+6	405	0
6068	McNew, William H. Calhourn Comm. Allot.				120	16	108	108	108	0	0	61	0
6069	Johnson, L. B. & Leona	3,398	1,466	4,864	312	12	192	153	153	0	-39	196	0
6070	Luchini, Frank et al.	1,018	210	1,228	96	12	60	61	61	5	+1	48	10
6071	Martinez, Pete E.	360	143	503	60	0	24	24	24	0	0	32	0

APPENDIX E-2 (cont'd)

(Caballo Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs) Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Proposed Forage Allocations (Fed'l AUMs) Livestock	Big Game	Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs) Livestock	Big Game
6072*	Meadow, Henry C.	5,867	10,774	16,641	3,492	60	1,248	1,237	1,237	10	-11	1,322	60
6073	Montoya, Romolo L.	434	477	911	120	0	60	60	60	4	0	27	9
6074*	Greeman, Walter	30,354	20,243	50,597	5,453	24	2,848	2,605	2,605	0	-243	2,818	0
6075	Tucker, Jay & Mable	4,663	5,413	10,076	1,293	12	441	443	443	0	+2	472	0
6076	McGregor, Carlton H.	504	19	523	144	12	144	144	144	0	0	182	0
6077	Ortiz, Ramon J. (leased - Armijo, Belsan B.)	962	111	1,073	120	0	96	96	96	0	0	68	0
6078	Ortega, Nicholas T.	474	271	745	144	0	144	144	144	1	0	119	6
6079	Greer, G. S.	5,700	3,036	8,736	1,192	0	853	862	862	11	+9	1,041	15
6080	Pankey Land and Cattle Co.	30,263	7,152	37,415	4,032	0	3,072	3,032	3,032	42	-40	2,906	89
6081	Pearson, R. L. and J. R.	6,327	1,157	7,484	720	0	588	531	531	0	-57	323	0
6082	Faubion, Carl	9,855	16,174	26,029	6,114	0	2,198	2,199	2,199	7	+1	2,134	48
6083	Potter, Johnson & Potter	5,962	640	6,602	900	12	804	678	678	0	-126	805	0
6084	Rainwater, Ralph	39,977	14,371	54,348	7,104	87	4,248	4,399	4,399	11	+151	3,527	45
6085	Chapman, Enos J.	7,364	3,065	10,429	1,255	14	864	815	815	0	-49	762	0
6086	Nave, Euel R.	1,152	1,251	2,403	324	36	156	141	141	0	-15	143	0
6087	Richardson, Jesse U.	2,700	1,348	4,048	1,908	0	660	668	668	0	+8	448	0
6088	Riggs, Fred S.	201	51	252	36	0	36	36	36	0	0	14	0
6089*	Rio Grazing Assoc.	8,744	3,791	12,535	2,988	60	2,904	2,840	2,840	16	-64	2,840	19
6090	Roberts, S. O. Jr.	3,041	2,093	5,134	624	0	624	624	624	1	0	819	1
6091	Ruidoso State Bank	5,691	803	6,494	531	9	447	297	297	0	-150	198	0
6093	Sanchez, Adan T.	1,765	1,741	3,506	612	12	264	266	266	0	+2	322	0
6094	Sedillo Community Allotment	2,801	1,370	4,171	792	0	492	490	490	0	-2	480	0
6095	Sedillo, Narciso	647	795	1,442	180	0	81	65	65	0	-16	33	0
6096	Luchini, Frank B.	2,016	1,220	3,236	344	4	212	216	216	7	+4	152	15
6097	Sedillo, Remigio Est.	540	816	1,356	360	0	96	91	91	0	-5	196	0
6098	Sullivan, Victor	796	1,120	1,916	168	0	168	168	168	2	0	116	4
6099	Tafoya, Ciriaco G.	643	19	662	55	0	53	57	57	0	+4	48	0
6100	Tafoya, Salomon	436	275	711	24	0	24	24	24	0	0	22	0
6101	Terrazas, Jack G. & J. G.	1,154	150	1,304	192	0	144	144	144	2	0	47	4
6102	Torres, Adan (Home)	2,885	3,054	5,939	1,080	0	432	422	422	0	-10	400	0

APPENDIX E-2 (cont'd)

(Caballo Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
6103	Torres, Adan (Salt Spring)	1,538	982	2,520	276	0	120	109	109	0	-11	121	0
6104	Diamond A Cattle Co.	316	1,746	2,062	348	0	96	96	96	0	0	80	0
6105	Trimble, G. F. & Levins, Scott	1,168	1,232	2,400	216	72	216	216	216	0	0	388	0
6106	Trujillo, Cristobal	665	2,338	3,003	528	0	108	109	109	0	+1	142	0
6108	Ruidoso State Bank	4,479	1,672	6,151	696	12	504	256	256	0	-248	294	0
6109	Downs, John B.	1,836	1,194	3,030	276	0	144	84	84	0	-60	153	0
6110*	Ward, Edwin J.	31,892	5,607	37,499	2,994	49	2,537	1,694	1,694	53	-843	2,846	61
6111	Church of Jesus Christ of Latter Day Saints	426	723	1,149	139	0	102	108	108	0	+6	19	0
6112	Welch, A. E.	160	170	330	24	0	24	24	24	0	0	6	0
6113	Woolf, Dale	6,537	497	7,034	960	0	912	912	912	20	0	610	23
6114	Candy Cane Corp.	4,295	0	4,295	1,500	0	1,500	1,500	1,500	18	0	230	150
6115	Cox, Jay W.	591	0	591	120	0	120	120	120	0	0	117	0
6116	Adams Ranch Inc.	2,295	0	2,295	348	0	348	348	348	0	0	446	0
6117	Diamond A Cattle Co.	6,031	0	6,031	1,224	0	1,224	1,142	1,142	12	-82	1,432	76
6119	Luna Brothers	40	0	40	12	0	12	12	12	0	0	6	0
6120	Lopez, Celso Estate	80	0	80	12	0	12	12	12	0	0	28	0
6121	Jones, Earl F.	141	0	141	36	0	36	32	32	0	-4	38	0
6122	Franzoy Cattle Co.	80	0	80	24	0	24	24	24	0	0	26	0
6123	Whittenburg, George	680	0	680	180	0	180	180	180	1	0	190	1
6124	Trimble and Levins	2,484	0	2,484	600	0	600	600	600	0	0	648	0
6125	Diamond A Cattle Co.	80	0	80	12	0	12	12	12	0	0	12	0
6126	Sullivan, Marianne	160	0	160	12	0	12	12	12	0	0	26	0
6127	Sanchez, Adan T.	586	0	586	108	0	108	108	108	0	0	131	0
6128	Roberts, S. O. Jr.	2,381	0	2,381	684	0	684	684	684	0	0	578	0
6129	Ortega, Nicholas T.	1,138	0	1,138	384	0	384	384	384	4	0	142	23
6130	Jones, Patrick A.	367	0	367	60	0	60	60	60	0	0	67	0
6131	Nunn, David	1,324	0	1,324	252	0	252	252	252	0	0	256	0
6132	Greeman, Walter	1,403	0	1,403	408	0	408	408	408	0	0	260	0
6133	Miranda, Mrs. B. T.	158	0	158	36	0	36	36	36	0	0	34	0

APPENDIX E-2 (concluded)
(Caballo Planning Unit)

Allot. No.	Allot. Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
					Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
6134	Richardson, Jesse U.	1,579	0	1,579	312	0	312	312	312	13	0	329	41
6135	Meadow, Henry C.	923	0	923	240	0	240	240	240	0	0	388	0
6136	Laney Ranch Inc.	5,394	0	5,394	1,524	0	1,524	1,524	1,524	24	0	1,485	32
6137	Hopkins, Velma	87	0	87	12	0	12	12	12	0	0	11	0
6138	Coil, Walter J.	440	0	440	84	0	84	84	84	0	0	91	0
6140	Lara, Robert E.	1,417	3,052	4,469	592	4	184	131	131	0	-53	120	0
6141	Muncy, Bobby W. (Sultemeier, Catherine)	7,210	1,627	8,837	540	24	444	347	347	0	-97	451	0
6142	Goff, Clyde	480	234	714	97	0	83	74	74	0	-9	32	0
6144	Nave, Euel	1,592	2,400	3,992	576	0	192	151	151	0	-41	168	0
6145	Cluff, Dale N.[e/]	11,148	2,207	13,355	1,124	14	960	729	729	0	-231	637	0
6146	Cluff, Cloard A.[e/]	23,641	2,044	25,685	2,893	48	2,640	2,006	2,006	0	-634	1,470	0
	SUBTOTALS	962,158	369,221	1,331,379	168,740	1,605	113,641	102,726	102,726	890	-10,915	100,858	1,879

Planning Unit Name	Acres - Public Land	Acres - Other Ownership	Total Allotment Acreage	Present Allocation (AUMs)				Proposed Forage Allocations (Fed'l AUMs)		Changes from Preference (AUMs)	Projected Goal by Year 2010 (AUMs)	
				Total AUMs (Pvt., State, Fed'l)	Big Game	Preference (Fed'l)	5-Year Average Licensed Use	Livestock	Big Game		Livestock	Big Game
Las Uvas Planning Unit	1,034,051	337,272	1,371,323	140,675	1,008	100,361	82,880	82,880	129	-17,481	105,380	256
Organ Mt. Planning Unit	121,393	76,277	197,670	14,692	108	9,615	6,758	6,758	747	-2,857	8,832	1,636
Caballo Planning Unit	962,158	369,221	1,331,379	168,740	1,605	113,641	102,726	102,726	890	-10,915	100,428	1,879
Totals for Planning Area (PA)	2,117,602	782,770	2,900,372	324,107	2,721	223,617	192,364	192,364	1,766	-31,253	215,070	3,771
Unallotted for PA	28,432	4,454	32,886									
Grand Total**	2,146,034	787,224	2,933,258									

Notes: a/Figured on 2-year average

b/Figured on 3-year average

c/Figured on 4-year average

d/Allotments located in two planning units (PUs). The amount of licensed use in this PU is based on percentage qualifications in the Las Uvas PU.

e/Licensed use for 1975-79 is based on percentage qualifications for each allotment after original allotment was divided. Allotment 6032 (Cluff Land & Cattle Co.) was divided into three separate allotments in 1980; 6032, 6145 and 6146.

*Indicates allotments with AMP

**Acres of other ownership does not reflect 516,776 acres of private and state lands not included in the SVIM survey. These lands include lands not within allotment boundaries and lands within lease areas.

APPENDIX E-3

PRESENT AND PROPOSED ALLOCATIONS BY LAND OWNERSHIP

Allot. #	Present Total AUMs (Pvt., State, Fed'l)	Present Fed'l AUMs	Present Controlled AUMs (Pvt. & State)	Proposed Total AUMs	Proposed Fed'l AUMs	Proposed Controlled AUMs	Change from Present Total to Proposed Total AUMs	Uncontrolled AUMs
2001	156	156	0	156	156	0	0	0
2002	516	432	84	512	430	82	-4	159
2031	1,248	450	798	1,253	451	802	+5	61
2051	4,164	2,616	1,548	3,644	2,296	1,348	-520	424
3001	1,440	1,308	132	1,193	1,086	107	-247	2
3002	1,632	1,500	132	1,533	1,410	123	-99	1
3003	1,752	1,584	168	991	892	99	-761	0
3004	120	96	24	83	66	17	-37	0
3006	12	12	0	12	12	0	0	0
3007	276	192	84	266	186	80	-10	0
3008	1,428	1,020	408	497	353	144	-931	3
3009	6,708	3,936	2,772	6,593	3,890	2,703	-115	19
3010	300	252	48	300	252	48	0	0
3011	624	372	252	313	188	125	-311	0
3012	1,800	1,380	420	1,801	1,387	414	+1	0
3013*	19,800	13,860	5,940	17,411	12,188	5,223	-2,389	64
3014	336	252	84	336	252	84	0	0
3015*	5,344	4,497	847	5,277	4,433	844	-67	0
3016	10,452	6,460	3,992	10,106	6,468	3,638	+346	50
3018	636	456	180	575	414	161	-61	101
3019	1,272	384	888	1,280	384	896	+8	67
3020	5,280	4,608	672	3,122	2,716	406	-2,158	0
3022	3,120	2,688	432	1,930	1,660	270	-1,190	1
3023	6,242	5,760	482	4,852	4,464	388	-1,390	24
3024*	12,204	6,012	6,192	11,982	5,871	6,111	-222	31
3025	636	360	276	635	362	273	-1	0
3026*	300	288	12	296	284	12	-4	0
3027	672	564	108	546	459	87	-126	0
3028	5,688	3,780	1,908	4,544	2,999	1,545	-1,144	49
3029	612	324	288	428	227	201	-184	6
3031	5,940	3,089	2,851	5,940	3,089	2,851	0	352
3032*	3,624	2,664	960	3,211	2,376	835	-413	0
3033	5,856	5,448	408	4,381	4,074	307	-1,475	0
3034	144	120	24	98	82	16	-46	0
3035	36	36	0	22	22	0	-14	0
3036	1,200	1,080	120	1,097	987	110	-103	0
3037	144	144	0	144	144	0	0	0
3038	3,864	2,844	1,020	1,469	1,087	382	-2,395	2
3039	7,332	5,508	1,824	6,537	4,903	1,634	-795	0
3040	1,320	636	684	846	406	440	-474	0
3041	204	192	12	206	194	12	+2	15
3042	12	12	0	12	12	0	0	0
3043	300	300	0	260	260	0	-40	0
3044	528	408	120	492	379	113	-36	3
3045	270	204	66	81	69	12	-189	0
3046	731	717	14	584	572	12	-147	24
3047	1,848	1,700	148	1,353	1,245	108	-495	22
3048	444	420	24	333	316	17	-111	0
3052	12,108	9,240	2,868	8,457	6,427	2,030	-3,651	0
5001	1,486	1,024	462	1,507	1,025	482	+21	361
5002	2,952	1,504	1,448	1,814	925	889	-1,138	125
5003	1,200	624	576	1,200	624	576	0	28
5004	492	492	0	436	436	0	-56	61
5006	312	275	37	197	173	24	-115	27
5007	3,528	1,920	1,608	2,067	1,116	951	-1,461	688
5008	414	396	18	413	396	17	-1	2
5009	2,016	1,593	423	592	468	124	-1,424	90
5010	396	191	205	375	180	195	-21	103
5012	396	168	228	360	151	209	-36	40
5013	1,500	1,428	72	1,331	1,264	67	-169	21
6001	648	600	48	641	596	45	-7	0
6002	1,164	1,044	120	1,321	1,189	132	+157	0
6003	228	228	0	51	51	0	-177	0
6004	2,220	1,260	960	2,214	1,262	952	-6	0
6005	372	372	0	372	372	0	0	0
6006	408	408	0	408	408	0	0	0

APPENDIX E-3 (cont'd)

PRESENT AND PROPOSED ALLOCATIONS BY LAND OWNERSHIP

Allot. #	Present Total AUMs (Pvt., State, Fed'l)	Present Fed'l AUMs	Present Controlled AUMs (Pvt. & State)	Proposed Total AUMs	Proposed Fed'l AUMs	Proposed Controlled AUMs	Change from Present Total to Proposed Total AUMs	Uncontrolled AUMs
6007	864	828	36	867	832	35	+3	0
6008	372	372	0	372	372	0	0	0
6009	504	504	0	504	504	0	0	0
6010	420	420	0	420	420	0	0	18
6011	84	36	48	84	36	48	0	0
6012	624	444	180	562	399	163	-62	0
6013	24	24	0	24	24	0	0	0
6014	132	132	0	92	92	0	-40	0
6015	12	12	0	12	12	0	0	0
6016	444	444	0	270	270	0	-174	2
6017	4,620	3,708	912	4,620	3,696	924	0	45
6018*	3,300	2,460	840	3,193	2,395	798	-107	0
6019	2,040	1,800	240	1,992	1,753	239	-48	0
6020	8,916	4,716	4,200	6,568	3,481	3,087	-2,348	16
6021*	6,360	2,772	3,588	4,502	1,981	2,521	-1,858	7
6022	8,856	5,532	3,324	6,145	3,810	2,335	-2,711	0
6023	1,044	756	288	425	306	119	-619	0
6024*	876	828	48	417	396	21	-459	0
6025	180	36	144	140	28	112	-40	8
6026	577	314	263	530	286	244	-47	0
6027	852	408	444	856	411	445	+4	216
6028	204	204	0	204	204	0	0	0
6029	36	36	0	36	36	0	0	0
6030	384	288	96	304	228	76	-80	0
6031	264	144	120	262	144	118	-2	17
6032	1,628	1,354	274	1,240	1,029	211	-388	0
6033	3,816	1,092	2,724	3,369	977	2,392	-447	121
6034	120	120	0	120	120	0	0	0
6035	504	504	0	504	504	0	0	3
6037	2,732	576	2,156	2,729	573	2,156	-3	172
6038	96	60	36	95	60	35	-1	0
6039	408	348	60	408	347	61	0	0
6040	552	552	0	552	552	0	0	8
6041	2,561	1,716	845	2,440	1,635	805	-121	10
6042	264	216	48	274	225	49	+10	0
6043	3,456	1,644	1,812	3,431	1,647	1,784	-25	0
6044*	2,577	2,160	417	1,864	1,566	298	-713	35
6045	576	216	360	426	162	264	-150	2
6046	924	405	519	578	155	423	-346	5
6047	216	216	0	199	199	0	-17	0
6048	1,320	1,104	216	943	792	151	-377	0
6049	2,659	2,435	224	2,647	2,435	212	-12	42
6050	1,390	1,075	315	1,363	1,050	313	-27	3
6053	7,236	6,372	864	7,080	6,230	850	-156	570
6054	504	312	192	505	313	192	+1	53
6055	428	228	200	407	228	179	-21	0
6056	3,533	2,532	1,001	3,422	2,464	958	-111	8
6057	6,948	3,384	3,564	6,939	3,400	3,539	-9	14
6058	746	720	26	725	696	29	-21	0
6059	1,800	1,428	372	1,662	1,313	349	-138	0
6060	1,440	1,382	58	1,278	1,227	51	-162	0
6061	36	36	0	36	36	0	0	0
6062	3,456	3,168	288	3,455	3,179	276	-1	0
6063	444	384	60	235	202	33	-209	0
6064	540	516	24	541	519	22	+1	2
6065	804	384	420	796	382	414	-8	71
6066	360	252	108	349	244	105	-11	13
6067	3,264	2,664	600	2,756	2,260	496	-508	22
6068	1,141	829	312	1,151	835	316	+10	58
6069	312	192	120	251	153	98	-61	24
6070	96	60	36	97	61	36	+1	0
6071	60	24	36	60	24	36	0	0
6072*	3,492	1,248	2,244	3,436	1,237	2,199	-56	28
6073	120	60	60	120	60	60	0	0
6074*	5,453	2,848	2,605	5,010	2,605	2,405	-443	147
6075	1,293	441	852	1,303	443	860	+10	0

APPENDIX E-3 (concluded)

PRESENT AND PROPOSED ALLOCATIONS BY LAND OWNERSHIP

Allot. #	Present Total AUMs (Pvt., State, Fed'l)	Present Fed'l AUMs	Present Controlled AUMs (Pvt. & State)	Proposed Total AUMs	Proposed Fed'l AUMs	Proposed Controlled AUMs	Change from Present Total to Proposed Total AUMs	Uncontrolled AUMs
6076	144	144	0	144	144	0	0	0
6077	120	96	24	120	96	24	0	0
6078	144	144	0	144	144	0	0	13
6079	1,192	853	339	1,214	862	352	+22	210
6080	4,032	3,072	960	3,989	3,032	957	-43	0
6081	720	588	132	648	531	117	-72	0
6082	6,114	2,198	3,916	6,108	2,199	3,909	-6	23
6083	900	804	96	770	678	92	-130	0
6084	7,104	4,248	2,856	7,332	4,399	2,933	+228	129
6085	1,255	864	391	1,181	815	366	-74	0
6086	324	156	168	294	141	153	-30	0
6087	1,908	660	1,248	1,909	668	1,241	+1	38
6088	36	36	0	36	36	0	0	0
6089*	2,988	2,904	84	2,928	2,840	88	-60	422
6090	624	624	0	624	624	0	0	0
6091	531	447	84	354	287	57	-177	0
6093	612	264	348	619	266	353	+7	0
6094	792	492	300	790	490	300	-2	210
6095	180	81	99	144	65	79	-36	0
6096	344	212	132	348	216	132	+4	2
6097	360	96	264	377	91	286	+17	0
6098	168	168	0	168	168	0	0	0
6099	55	53	2	59	57	2	+4	0
6100	24	24	0	24	24	0	0	0
6101	192	144	48	192	144	48	0	0
6102	1,080	432	648	2,110	422	1,688	+1,030	3
6103	276	120	156	253	109	144	-23	0
6104	348	96	252	343	96	247	-5	24
6105	216	216	0	216	216	0	0	0
6106	528	108	420	519	109	410	-9	0
6108	696	504	192	356	256	100	-340	0
6109	276	144	132	162	84	78	-114	10
6110*	2,994	2,537	457	1,993	1,694	299	-1,001	0
6111	139	102	37	148	108	40	+9	0
6112	24	24	0	24	24	0	0	0
6113	960	912	48	960	912	48	0	0
6114	1,500	1,500	0	1,500	1,500	0	0	0
6115	120	120	0	120	120	0	0	0
6116	348	348	0	348	348	0	0	0
6117	1,224	1,224	0	1,142	1,142	0	-82	0
6119	12	12	0	12	12	0	0	0
6120	12	12	0	12	12	0	0	0
6121	36	36	0	32	32	0	-4	0
6122	24	24	0	24	24	0	0	0
6123	180	180	0	180	180	0	0	0
6124	600	600	0	600	600	0	0	0
6125	12	12	0	12	12	0	0	0
6126	12	12	0	12	12	0	0	0
6127	108	108	0	108	108	0	0	0
6128	684	684	0	684	684	0	0	0
6129	384	384	0	384	384	0	0	0
6130	60	60	0	60	60	0	0	0
6131	252	252	0	252	252	0	0	0
6132	408	408	0	408	408	0	0	0
6133	36	36	0	36	36	0	0	0
6134	312	312	0	312	312	0	0	0
6135	240	240	0	240	240	0	0	0
6136	1,524	1,524	0	1,524	1,524	0	0	0
6137	12	12	0	12	12	0	0	0
6138	84	84	0	84	84	0	0	0
6140	592	184	408	423	131	292	-169	0
6141	540	444	96	423	347	76	-117	8
6142	97	83	14	86	74	12	-11	0
6144	576	192	384	458	151	307	-118	0
6145	1,124	960	164	858	729	729	-266	0
6146	2,893	2,640	253	2,204	2,006	198	-689	0
TOTALS	324,107	223,617	100,490	281,636	192,364	89,272	-42,471	5,858

Source: BLM Las Cruces District Office EIS Team Files, 1980.

Notes: *Indicates allotments with AMPs.

APPENDIX E-4

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Proposed Action and Enhancement of Other Resource Values)

Allotment Number	Development[b]	Quantity and Unit	Average Acres Disturbed Per Unit Short Term	Per Unit Long Term	Total Short Term	Total Long Term	Average Cost Per Unit	Total Cost
2001	Fence	2 mi.	1.00	0.20	2.00	0.40	$ 4,000	$ 8,000
2002	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Fence	8.7 mi.	1.00	0.20	8.70	1.74	4,000	34,800
3001	Pipeline	.5 mi.	1.50	0.10	0.75	0.05	5,000	2,500
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	4.3 mi.	1.00	0.20	4.30	0.86	4,000	17,200
3002	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Fence	3.3 mi.	1.00	0.20	3.30	0.66	4,000	13,200
3003	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	15 mi.	1.00	0.20	15.00	3.00	4,000	60,000
3008	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	3.5 mi.	1.00	0.20	3.50	0.70	4,000	14,000
	Cattleguard	1	0.06	0.06	0.06	0.06	3,000	3,000
3010	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3011	Pipeline	.5 mi.	1.50	0.10	0.75	0.05	5,000	2,500
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3012	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	3	0.10	0.08	0.30	0.24	750	2,250
	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
3014	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	6 mi.	1.00	0.20	6.00	1.20	4,000	24,000
3015	Cattleguards	2	0.06	0.06	0.12	0.12	3,000	6,000
3016	Pipeline	8 mi.	1.50	0.10	12.00	0.80	5,000	40,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
3020	Pipeline	20 mi.	1.50	0.10	30.00	2.00	5,000	100,000
	Drinking Troughs	10	0.10	0.08	1.00	0.80	750	7,500
	Wells w/pump or windmill	3 ea.	0.50	0.10	1.50	0.30	30,000	90,000
	Fence	24 mi.	1.00	0.20	24.00	4.80	4,000	96,000
3023	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Troughs	8	0.10	0.08	0.80	0.64	750	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	18 mi.	1.00	0.20	18.00	3.60	4,000	72,000
	Cattleguard	2	0.06	0.06	0.12	0.12	3,000	6,000
3027	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Erosion Dikes (1110 cu. yds.)	3	1.00	[c]	3.00		833	2,499
3028	Fence	.75 mi.	1.00	0.20	0.75	0.15	4,000	3,000
3031	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3032	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Trough	3	0.10	0.08	0.30	0.24	750	2,250

APPENDIX E-4 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Proposed Action and Enhancement of Other Resource Values)

Allotment Number	Development[b/]	Quantity and Unit	Average Acres Disturbed Per Unit Short Term	Per Unit Long Term	Total Short Term	Total Long Term	Average Cost Per Unit	Total Cost
3033	Pipeline	2 mi.	1.50	0.10	3.00	0.20	$ 5,000	$10,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	24 mi.	1.00	0.20	24.00	4.00	4,000	96,000
3034	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
3036	Fence	4 mi.	1.00	0.20	4.00	0.80	4,000	16,000
	Dikes (1,110 cu. yds.)	6	1.00	c/	6.00		833	4,998
3040	Pipeline	4.5 mi.	1.50	0.10	6.75	0.45	5,000	22,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
3043	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
3044	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
3046	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
3047	Pipeline	1.7 mi.	1.50	0.10	2.55	0.17	5,000	8,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	9 mi.	1.00	0.20	9.00	1.80	4,000	36,000
3048	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	$ 6,000	$ 6,000
3052	Pipeline	8 mi.	1.50	0.10	12.00	0.80	5,000	40,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	13 mi.	1.00	0.02	13.00	0.26	4,000	52,000
5001	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	4 mi.	1.00	0.20	4.00	0.80	4,000	16,000
5002	Pipeline	2.25 mi.	1.50	0.10	3.38	0.23	5,000	11,250
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	6.5 mi.	1.00	0.20	6.50	1.30	4,000	26,000
	Cattleguards	2	0.06	0.06	0.12	0.12	3,000	6,000
5003	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Spring	1	0.10	0.05	0.10	0.05	500	500
	Fence	.5 mi.	1.00	0.20	0.50	0.10	4,000	2,000
5004	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	2 mi.	1.00	0.20	2.00	0.40	4,000	8,000
5013	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6001	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	5,000	7,500
	Drinking Trough	2	0.10	0.08	0.20	0.16	750	1,500
	Dikes	4	1.00	c/	4.00		833	3,332
6002	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	5	0.10	0.08	0.50	0.40	750	3,750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000

APPENDIX E-4 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Proposed Action and Enhancement of Other Resource Values)

Allotment Number	Development[b/]	Quantity and Unit	Average Acres Disturbed				Average Cost Per Unit	Total Cost
			Per Unit Short Term	Per Unit Long Term	Total Short Term	Total Long Term		
6007	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	$13,800	$13,800
	Fence	2 mi.	1.00	0.20	2.00	0.40	4,000	8,000
6010	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
6016	Dirt Tanks (8,000 cu. yds.)	2	3.80	1.80	7.60	3.60	6,000	12,000
6017	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	5,000	17,500
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	14.5 mi.	1.00	0.20	14.50	2.90	4,000	58,000
6019	Pipeline	10.5 mi.	1.50	0.10	15.75	1.05	5,000	52,500
	Drinking Troughs	13	0.10	0.08	1.30	1.04	750	9,750
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	5.25 mi.	1.00	0.20	5.25	1.05	4,000	21,000
	Dikes (1,110 cu. yds.)	27	1.00	c/	27.00		833	22,491
6020	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	8 mi.	1.00	0.20	8.00	1.60	4,000	32,000
	Dikes (1,110 cu. yds.)	8	1.00	c/	8.00		833	6,664
6022	Pipeline	6 mi.	1.50	0.10	9.00	0.60	5,000	30,000
	Dirt Tank	1	3.80	1.80	3.80	1.80	6,000	6,000
	Drinking Trough	7	0.50	0.10	3.50	0.70	750	5,250
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
6023	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	5,000	7,500
	Dirt Tanks	2	3.80	1.80	7.60	3.60	6,000	12,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	6 mi.	1.00	0.20	6.00	1.20	4,000	24,000
6026	Drinking Trough	1	0.10	0.08	0.10	0.08	$ 750	$ 750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6027	Pipeline	1.75 mi.	1.50	0.10	2.63	0.18	5,000	8,750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6033	Fence	3 mi.	1.00	0.20	3.00	0.60	4,000	12,000
6035	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
6037	Fence	3 mi.	1.00	0.20	3.00	0.60	4,000	12,000
6039	Fence	3.5 mi.	1.00	0.20	3.50	0.70	4,000	14,000
	Dikes (1,110 cu. yds.)	7	1.00	c/	7.00		833	5,831
6041	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	5,000	17,500
	Drinking Troughs	7	0.10	0.08	0.70	0.56	750	5,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
6042	Pipeline	.75 mi.	1.50	0.10	1.13	0.08	5,000	3,750
	Dikes (1,110 cu. yds.)	2	1.00	c/	2.00		833	1,666
6043	Dike (1,110 cu. yds.)	1	1.00	c/	1.00		833	833
6046	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6048	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	5,000	17,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	7	0.10	0.08	0.70	0.56	750	5,250
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000

APPENDIX E-4 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Proposed Action and Enhancement of Other Resource Values)

Allotment Number	Development[b]	Quantity and Unit	Average Acres Disturbed Per Unit Short Term	Average Acres Disturbed Per Unit Long Term	Average Acres Disturbed Total Short Term	Average Acres Disturbed Total Long Term	Average Cost Per Unit	Total Cost
6049	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	$13,800	$27,600
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6050	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dikes (1,110 cu. yds.)	2	1.00	[c]	2.00		833	1,666
6053	Pipeline	10 mi.	1.50	0.10	15.00	1.00	5,000	50,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Dirt Tanks	2	3.80	1.80	7.60	3.60	6,000	12,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6054	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6056	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6059	Pipeline	6.5 mi.	1.50	0.10	9.75	0.65	5,000	32,500
	Drinking Troughs	15	0.10	0.08	1.50	1.20	750	11,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Fence	1.75 mi.	1.00	0.20	1.75	0.35	4,000	7,000
	Dikes (1,110 cu. yds.)	6	1.00	[c]	6.00		833	4,998
6062	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
	Dikes (1,110 cu. yds.)	20	1.00	[c]	20.00		833	16,660
6067	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Dikes (1,110 cu. yds.)	8	1.00	[c]	8.00		833	6,664
6068	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	$ 5,000	$ 7,500
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
6069	Fence	3.25 mi.	1.00	0.20	3.25	0.65	4,000	13,000
6070	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6072	Pipeline	2.3 mi.	1.50	0.10	3.45	0.23	5,000	11,500
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
6075	Pipeline	5.5 mi.	1.50	0.10	8.25	0.55	5,000	27,500
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
6080	Pipeline	8.75 mi.	1.50	0.10	13.13	0.88	5,000	43,750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	9	0.10	0.08	0.90	0.72	750	6,750
6081	Pipeline	2.3 mi.	1.50	0.10	3.45	0.23	5,000	11,500
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6082	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Fence	9 mi.	1.00	0.20	9.00	1.80	4,000	36,000
	Dike (1,110 cu. yds.)	1	1.00	[c]	1.00		833	833
6083	Pipeline	.25 mi.	1.50	0.10	0.38	0.03	5,000	1,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	3.5 mi.	1.00	0.20	3.50	0.70	4,000	14,000
	Dikes (1,110 cu. yds.)	10	1.00	[c]	10.00		833	8,330

APPENDIX E-4 (concluded)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Proposed Action and Enhancement of Other Resource Values)

Allotment Number	Development[b/]	Quantity and Unit	Average Acres Disturbed				Average Cost Per Unit	Total Cost
			Per Unit		Total			
			Short Term	Long Term	Short Term	Long Term		
6085	Pipeline	1 mi.	1.50	0.10	1.50	0.10	$ 5,000	$ 5,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
6091	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
6093	Pipeline	.33 mi.	1.50	0.10	0.50	0.03	5,000	1,650
	Drinking Troughs	1	0.10	0.08	0.10	0.08	750	750
	Fence	4.5 mi.	1.00	0.20	4.50	0.90	4,000	18,000
6094	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
6102	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
6108	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6109	Fence	1.1 mi.	1.00	0.20	1.10	0.22	4,000	4,400
6113	Pipeline	.25 mi.	1.50	0.10	0.38	0.03	5,000	1,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1.25 mi.	1.00	0.20	1.25	0.25	4,000	5,000
6140	Fence	1.9 mi.	1.00	0.20	1.90	0.38	4,000	7,600
6145	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Fence	7 mi.	1.00	0.20	7.00	1.40	4,000	28,000
6146	Pipeline	4 mi.	1.50	0.10	6.00	0.40	$ 5,000	$20,000
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
	Fence	17 mi.	1.00	0.20	17.00	3.40	4,000	68,000
TOTALS					733.80	114.48		3,830,965

Source: BLM Las Cruces District Office Planning Documents, 1980.

Notes: a/All rangeland developments are primarily for livestock. However, wildlife will benefit from additional waters.
b/Depth of wells and size of storage tanks and dikes will vary. The costs were estimated on an average.
c/There would be a minimal long-term disturbance.

APPENDIX E-5

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Maximization of Livestock Forage Production)

			Average Acres Disturbed					
			Per Unit		Total			
Allotment Number	Development[b]	Quantity and Unit	Short Term	Long Term	Short Term	Long Term	Average Cost Per Unit	Total Cost
2001	Fence	2 mi.	1.00	0.20	2.00	0.40	$ 4,000	$ 8,000
2002	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Fence	8.7 mi.	1.00	0.20	8.70	1.74	4,000	34,800
3001	Pipeline	.5 mi.	1.50	0.10	0.75	0.05	5,000	2,500
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	4.3 mi.	1.00	0.20	4.30	0.86	4,000	17,200
3002	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Fence	3.3 mi.	1.00	0.20	3.30	0.66	4,000	13,200
3003	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	15 mi.	1.00	0.20	15.00	3.00	4,000	60,000
3008	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	3.5 mi.	1.00	0.20	3.50	0.70	4,000	14,000
	Cattleguard	1	0.06	0.06	0.06	0.06	3,000	3,000
3010	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3011	Pipeline	.5 mi.	1.50	0.10	0.75	0.05	5,000	2,500
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3012	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	3	0.10	0.08	0.30	0.24	750	2,250
	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
3014	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	6 mi.	1.00	0.20	6.00	1.20	4,000	24,000
3015	Cattleguards	2	0.06	0.06	0.12	0.12	3,000	6,000
3016	Pipeline	8 mi.	1.50	0.10	12.00	0.80	5,000	40,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
3020	Pipeline	20 mi.	1.50	0.10	30.00	2.00	5,000	100,000
	Drinking Troughs	10	0.10	0.08	1.00	0.80	750	7,500
	Wells w/pump or windmill	3 ea.	0.50	0.10	1.50	0.30	30,000	90,000
	Fence	24 mi.	1.00	0.20	24.00	4.80	4,000	96,000
3023	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Troughs	8	0.10	0.08	0.80	0.64	750	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	18 mi.	1.00	0.20	18.00	3.60	4,000	72,000
	Cattleguard	2	0.06	0.06	0.12	0.12	3,000	6,000
3027	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dikes (1110 cu. yds.)	3	1.00	[c]	3.00		833	2,499
3028	Fence	.75 mi.	1.00	0.20	0.75	0.15	4,000	3,000
3031	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
3032	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Drinking Trough	3	0.10	0.08	0.30	0.24	750	2,250
3033	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Drinking Trough	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	24 mi.	1.00	0.20	24.00	4.80	4,000	96,000

APPENDIX E-5 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Maximization of Livestock Forage Production)

			Average Acres Disturbed					
			Per Unit		Total			
Allotment Number	Development[b/]	Quantity and Unit	Short Term	Long Term	Short Term	Long Term	Average Cost Per Unit	Total Cost
3034	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
3036	Fence	4 mi.	1.00	0.20	4.00	0.80	4,000	16,000
	Dikes (1,110 cu. yds.)	6	1.00	c/	6.00		833	4,998
3040	Pipeline	4.5 mi.	1.50	0.10	6.75	0.45	5,000	22,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
3043	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
3044	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
3046	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
3047	Pipeline	1.7 mi.	1.50	0.10	2.55	0.17	5,000	8,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	9 mi.	1.00	0.20	9.00	1.80	4,000	36,000
3048	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	$ 6,000	$ 6,000
3052	Pipeline	8 mi.	1.50	0.10	12.00	0.80	5,000	40,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Fence	13 mi.	1.00	0.02	13.00	0.26	4,000	52,000
5001	Drinking Trough	1	0.10	0.08	0.10	0.08	$ 750	$ 750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	4 mi.	1.00	0.20	4.00	0.80	4,000	16,000
5002	Pipeline	2.25 mi.	1.50	0.10	3.38	0.23	5,000	11,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	6.5 mi.	1.00	0.20	6.50	1.30	4,000	26,000
	Cattleguards	2	0.06	0.06	0.12	0.12	3,000	6,000
5003	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Spring	1	0.10	0.05	0.10	0.05	500	500
	Fence	.5 mi.	1.00	0.20	0.50	0.10	4,000	2,000
5004	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	2 mi.	1.00	0.20	2.00	0.40	4,000	8,000
5009	Pipeline	9 mi.	1.50	0.10	13.50	0.90	5,000	45,000
	Drinking Troughs	8	0.10	0.08	0.80	0.64	750	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	2 mi.	1.00	0.20	2.00	0.40	4,000	8,000
	Cattleguards	2	0.06	0.06	0.12	0.12	3,000	6,000
5013	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6001	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	5,000	7,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dikes (1,110 cu. yds.)	4	1.00	c/	4.00		833	3,332

APPENDIX E-5 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Maximization of Livestock Forage Production)

Allotment Number	Development[b]	Quantity and Unit	Average Acres Disturbed Per Unit Short Term	Average Acres Disturbed Per Unit Long Term	Average Acres Disturbed Total Short Term	Average Acres Disturbed Total Long Term	Average Cost Per Unit	Total Cost
6002	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	$ 5,000	$ 12,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	5	0.10	0.08	0.50	0.40	750	3,750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6003	Fence	1.25 mi.	1.00	0.20	1.25	0.25	4,000	5,000
6004	Pipeline	1.75 mi.	1.50	0.10	2.63	0.18	5,000	8,750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	5.25 mi.	1.00	0.20	5.25	1.05	4,000	21,000
6007	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Fence	2 mi.	1.00	0.20	2.00	0.40	4,000	8,000
6010	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6012	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6016	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dirt Tanks (8,000 cu. yds.)	2	3.80	1.80	7.60	3.60	6,000	6,000
6017	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	5,000	17,500
	Drinking Troughs	10	0.10	0.08	1.00	0.80	750	7,500
	Storage Tanks (20,000 gal.)	6	0.30	0.05	1.80	0.30	13,800	82,800
	Wells w/pump or windmill	5 each	0.50	0.10	2.50	0.50	30,000	150,000
	Fence	14.5 mi.	1.00	0.20	14.50	2.90	4,000	58,000
6019	Pipeline	10.5 mi.	1.50	0.10	15.75	1.05	$ 5,000	$ 52,500
	Drinking Troughs	13	0.10	0.08	1.30	1.04	750	9,750
	Storage Tanks (20,000 gal.)	8	0.30	0.05	2.40	0.40	13,800	110,400
	Wells w/pump or windmill	5 each	0.50	0.10	2.50	0.50	30,000	150,000
	Fence	5.25 mi.	1.00	0.20	5.25	1.05	4,000	21,000
	Dikes (1,110 cu. yds.)	27	1.00	[c]	27.00		833	22,491
6020	Pipeline	11 mi.	1.50	0.10	16.5	1.10	5,000	55,000
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
	Drinking Troughs	11	0.10	0.08	1.10	0.88	750	8,250
	Wells w/pump or windmill	3 each	0.50	0.10	1.50	0.30	30,000	90,000
	Fence	14.5 mi.	1.00	0.20	14.50	2.90	4,000	58,000
	Dikes (1,110 cu. yds.)	30	1.00	[c]	30.00		833	24,990
6021	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Storage Tanks (20,000 gal.)	5	0.30	0.05	1.50	0.25	13,800	69,000
	Drinking Troughs	5	0.10	0.08	0.50	0.40	750	3,750
	Wells w/pump or windmill	5 each	0.50	0.10	2.50	0.50	30,000	150,000
6022	Pipeline	10 mi.	1.50	0.10	15.00	1.00	5,000	50,000
	Storage Tanks (20,000 gal.)	5	0.30	0.05	1.50	0.25	13,800	69,000
	Drinking Troughs	14	0.10	0.08	1.40	1.12	750	10,500
	Wells w/pump or windmill	4 each	0.50	0.10	2.00	0.40	30,000	120,000
6023	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tanks (20,000 gal.)	4	0.30	0.05	1.20	0.20	13,800	55,200
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Wells w/pump or windmill	3 each	0.50	0.10	1.50	0.30	30,000	90,000
	Fence	6 mi.	1.00	0.20	6.00	1.20	4,000	24,000
	Dirt Tanks (8,000 cu. yds.)	2	3.80	1.80	7.60	3.60	6,000	12,000

APPENDIX E-5 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Maximization of Livestock Forage Production)

			Average Acres Disturbed					
			Per Unit		Total			
Allotment Number	Development[b]	Quantity and Unit	Short Term	Long Term	Short Term	Long Term	Average Cost Per Unit	Total Cost
6024	Pipeline	4 mi.	1.50	0.10	6.00	0.40	$ 5,000	$ 20,000
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6026	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6027	Pipeline	1.75 mi.	1.50	0.10	2.63	0.18	5,000	8,750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6030	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6032	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6033	Fence	3 mi.	1.00	0.20	3.00	0.60	4,000	12,000
6035	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6037	Fence	3 mi.	1.00	0.20	3.00	0.60	4,000	12,000
6039	Fence	3.7 mi.	1.00	0.20	3.70	0.74	4,000	14,800
	Dikes (1,110 cu. yds.)	7	1.00	[c]	7.00		833	5,831
6041	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	$ 5,000	$ 17,500
	Drinking Troughs	7	0.10	0.08	0.70	0.56	750	5,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	2.5 mi.	1.00	0.20	2.50	0.50	4,000	10,000
6042	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Dikes (1,110 cu. yds.)	2	1.00	[c]	2.00		833	1,666
6043	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dike (1,110 cu. yds.)	1	1.00	[c]	1.00		833	833
6044	Pipeline	5 mi.	1.50	0.10	7.50	0.50	5,000	25,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	5	0.10	0.08	0.50	0.40	750	3,750
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6045	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	5,000	7,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6046	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000

APPENDIX E-5 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a]

(Maximization of Livestock Forage Production)

			Average Acres Disturbed					
			Per Unit		Total			
Allotment Number	Development[b]	Quantity and Unit	Short Term	Long Term	Short Term	Long Term	Average Cost Per Unit	Total Cost
6048	Pipeline	4 mi.	1.50	0.10	6.00	0.40	$ 5,000	$ 20,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	7	0.10	0.08	0.70	0.56	750	5,250
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6049	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells	2	0.50	0.10	1.00	0.20	30,000	60,000
6050	Pipeline	3.5 mi.	1.50	0.10	5.25	0.35	5,000	17,500
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	5	0.10	0.08	0.50	0.40	750	3,750
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Dikes (1,110 cu. yds.)	2	1.00	c/	2.00		833	1,666
6053	Pipeline	10 mi.	1.50	0.10	15.00	1.00	5,000	50,000
	Storage Tanks (20,000 gal.)	6	0.30	0.05	1.80	0.30	13,800	82,800
	Drinking Troughs	10	0.10	0.08	1.00	0.80	750	7,500
	Dirt Tanks (8,000 cu. yds.)	2	3.80	1.80	7.60	3.60	6,000	12,000
	Wells w/pump or windmill	6 each	0.50	0.10	3.00	0.60	30,000	180,000
6054	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6055	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
6056	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6057	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	$13,800	$ 41,400
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	3 each	0.50	0.10	1.50	0.30	30,000	90,000
6058	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
6059	Pipeline	6.5 mi.	1.50	0.10	9.75	0.65	5,000	32,500
	Drinking Troughs	15	0.10	0.08	1.50	1.20	750	11,250
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Fence	1.75 mi.	1.00	0.20	1.75	0.35	4,000	7,000
	Dikes (1,110 cu. yds.)	6	1.00	c/	6.00		833	4,998
6062	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
	Dikes (1,110 cu. yds.)	40	1.00	c/	40.00		833	33,320
6063	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6065	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6067	Pipeline	2 mi.	1.50	0.10	3.00	0.20	5,000	10,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dikes (1,110 cu. yds.)	8	1.00	c/	8.00		833	6,664

APPENDIX E-5 (cont'd)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Maximization of Livestock Forage Production)

Allotment Number	Development[b/]	Quantity and Unit	Average Acres Disturbed				Average Cost Per Unit	Total Cost
			Per Unit		Total			
			Short Term	Long Term	Short Term	Long Term		
6068	Pipeline	1.5 mi.	1.50	0.10	2.25	0.15	$ 5,000	$ 7,500
	Storage Tank (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
6069	Fence	3.25 mi.	1.00	0.20	3.25	0.65	4,000	13,000
6070	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Wells w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6072	Pipeline	2.3 mi.	1.50	0.10	3.45	0.23	5,000	11,500
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
6074	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Wells w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6075	Pipeline	5.5 mi.	1.50	0.10	8.25	0.55	5,000	27,500
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
6079	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6080	Pipeline	8.75 mi.	1.50	0.10	13.13	0.88	5,000	43,750
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	9	0.10	0.08	0.90	0.72	750	6,750
6081	Pipeline	2.5 mi.	1.50	0.10	3.75	0.25	5,000	12,500
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6082	Pipeline	4 mi.	1.50	0.10	6.00	0.40	$ 5,000	$20,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	4	0.10	0.08	0.40	0.32	750	3,000
	Wells w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	9 mi.	1.00	0.20	9.00	1.80	4,000	36,000
	Dike (1,110 cu. yds.)	1	1.00	c/	1.00		833	833
6083	Pipeline	3 mi.	1.50	0.10	4.50	0.30	5,000	15,000
	Fence	3.5 mi.	1.00	0.20	3.50	0.70	4,000	14,000
	Dikes (1,110 cu. yds.)	10	1.00	c/	10.00		833	8,330
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1	0.50	0.10	0.50	0.10	30,000	30,000
6084	Pipeline	10 mi.	1.50	0.10	10.50	1.00	5,000	50,000
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
	Drinking Troughs	7	0.10	0.08	0.70	0.56	750	5,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	11 mi.	1.00	0.20	11.00	2.20	4,000	44,000
	Dikes (1,110 cu. yds.)	50	1.00	c/	50.00		833	41,650
6085	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	2	0.10	0.08	0.20	0.16	750	1,500
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	1 mi.	1.00	0.20	1.00	0.20	4,000	4,000
6087	Storage Tank	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000

APPENDIX E-5 (concluded)

PROPOSED LIVESTOCK RANGELAND IMPROVEMENTS[a/]

(Maximization of Livestock Forage Production)

			Average Acres Disturbed					
			Per Unit		Total			
Allotment Number	Development[b/]	Quantity and Unit	Short Term	Long Term	Short Term	Long Term	Average Cost Per Unit	Total Cost
6091	Pipeline	2 mi.	1.50	0.10	3.00	0.20	$ 5,000	$ 10,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6093	Pipeline	4.5 mi.	1.50	0.10	6.75	0.45	5,000	22,500
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Fence	4.5 mi.	1.00	0.20	4.50	0.90	4,000	18,000
6094	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6095	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
6102	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
	Dikes (1,110 cu. yds.)	6	1.00	c/	6.00		833	4,998
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	22.80	10.80	6,000	6,000
6103	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6108	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6109	Fence	1.1 mi.	1.00	0.20	1.10	0.22	4,000	4,400
6110	Storage Tanks (20,000 gal.)	3	0.30	0.50	0.90	0.15	$13,800	$ 41,400
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	3	0.50	0.10	1.50	0.30	30,000	90,000
6111	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6113	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Wells w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	1.25 mi.	1.00	0.20	1.25	0.25	4,000	5,000
6140	Fence	1.9 mi.	1.00	0.20	1.90	0.38	4,000	7,600
6144	Storage Tank (20,000 gal.)	1	0.30	0.05	0.30	0.05	13,800	13,800
	Drinking Trough	1	0.10	0.08	0.10	0.08	750	750
	Well w/pump or windmill	1 each	0.50	0.10	0.50	0.10	30,000	30,000
6145	Pipeline	1 mi.	1.50	0.10	1.50	0.10	5,000	5,000
	Storage Tanks (20,000 gal.)	2	0.30	0.05	0.60	0.10	13,800	27,600
	Drinking Troughs	3	0.10	0.08	0.30	0.24	750	2,250
	Well w/pump or windmill	2 each	0.50	0.10	1.00	0.20	30,000	60,000
	Fence	7 mi.	1.00	0.20	7.00	1.40	4,000	28,000
	Dirt Tank (8,000 cu. yds.)	1	3.80	1.80	3.80	1.80	6,000	6,000
6146	Pipeline	4 mi.	1.50	0.10	6.00	0.40	5,000	20,000
	Storage Tanks (20,000 gal.)	3	0.30	0.05	0.90	0.15	13,800	41,400
	Drinking Troughs	6	0.10	0.08	0.60	0.48	750	4,500
	Fence	17 mi.	1.00	0.20	17.00	3.40	4,000	68,000
TOTALS					1,066.71	162.49		$7,992,449

Source: BLM Las Cruces District Office Planning Documents, 1980.

Notes:
[a/] All rangeland developments are primarily for livestock. However, wildlife will benefit from additional waters.
[b/] Depth of wells and size of storage tanks and dikes will vary. The costs were estimated on an average.
[c/] There would be a minimal long-term disturbance.

APPENDIX E-6

GUIDELINES FOR VEGETATION TREATMENTS

Specifics on the methods to be used during the application of herbicides are as follows.

1. Aerial applications of liquid herbicides would make use of fixed-wing aircraft with positive shutoff spray systems, special drift reduction nozzles and spray mix adjuvants to apply herbicides to the specific target areas. Aerial applications would be accomplished under a contract to be let through competitive bidding processes. These applications would take place between mid-May and the first of July.

2. Aerial applications of granular herbicides would also make use of fixed-wing aircraft with a positive shutoff application chute. All aerial dispersion would be accomplished by contractors. These herbicide applications would take place from mid-May through mid-September depending on target species (mesquite mid-May to July 1, creosote July 1 through mid-September) and research recommendations.

Policies and laws that would be followed in the proposed brush control with herbicides program are:

1. Environmental impacts would be identified through a site-specific environmental assessment and measures taken to mitigate potentially adverse environmental impacts for each specific treatment location.

2. Programs would be reviewed with user groups, interested organizations and the general public.

3. Only federally registered herbicides would be used on public land except as authorized by Section 24.c., Public Law 92-516, the Federal Environmental Pesticide Control Act of 1972. Section 24.c. provides for state registration of certain herbicides for local needs within the state. Any herbicide proposal planned under a state registration would include a copy of the state label.

4. Tank mixes of herbicides may be approved if: such mixture is provided for on one or more labels of EPA registered products; provided for under a state registration, or if the tank mix has been tested and has a written recommendation by an Agricultural Experiment Station or the State Department of Agriculture. The herbicides recommended in the mixture must be applied at a dosage rate not to exceed the label instructions for use of any single product for the same target pest and must not be specifically prohibited from mixing on either label. Each tank mix proposal must be accompanied by appropriate labels or a written recommendation.

5. On May 5, 1975, EPA announced the initiation of the Pesticide Enforcement Policy Statements (PEPS) series. These statements are published in the Federal Register and are intended to clarify EPA's policy regarding the enforcement of the Federal Insecticide, Fungicide and Rodenticide Act. PEP No. 1, published May 5, 1975, and September 17, 1975, allows for the use of a registered herbicide at less than the label dosage if such use is recommended in writing by a knowledgeable expert.

6. Integrated brush control methods which may combine chemical, manual, mechanical, or biological control techniques will be used where they minimize the adverse impact of brush control.

7. All proposed use of herbicides on public land would be reviewed for approval in advance by the Bureau's Washington, D. C., office.

8. Federal and state agencies with responsibilities for the environment, public health, and fish and wildlife would be informed of programs and cooperative measures developed when necessary.

9. Only properly trained or licensed personnel would handle and use herbicides on public land. This includes applications by permittees, grantees, or licensees. At least one member of the application crew and the BLM on-the-ground supervisor must be a certified applicator.

10. All individuals associated with the handling or application of herbicides on public land would be familiar with emergency procedures to be used in case of a herbicide spill.

There would be specific measures included in the design of each proposed herbicide project in order to minimize adverse impacts on the environment. They include the following:

1. Any specific BLM-proposed herbicide project would be preceded by a preliminary archeological survey. An evaluation of the findings would determine whether there are sites of value and whether they should be salvaged by removal or left and circumvented by the project.

2. On herbicide application projects conducted directly by Bureau personnel, an employee holding a valid herbicide application certification would monitor and supervise the project. Work done by contractors would be carried out by individuals having a valid state certification.

3. Contracts for application would require that the intake operation of water for mixing shall be arranged so that an air gap or reservoir will be placed between the live water intake and the mixed tank to prevent any backflow of chemical into the water source.

4. Contracts for application would require that contractors not wash out any spray tanks in or near any streams or dispose of any chemical containers on the contract area.

5. During aerial spraying, spray would be turned off at the end of spray runs and during the time when a turn is being made to start another spray run. Initial spray swaths along buffer strips or other areas to be protected would be made parallel to these areas before spraying commences on the rest of the project area.

6. Mixing and loading operations would take place in an area where an accidental spill would not flow into a stream or body of water.

7. The following is the minimum width (measured horizontally) for unsprayed buffer strips for all herbicides applied adjacent to the Rio Grande, any livestock watering locations, ranch houses, or known locations of threatened or endangered plants:

Aerial Spraying

Spraying altitude (over ground)	Buffer strip
15-20 feet	1,500 feet

No foliar herbicide would be applied within 100 yards of livestock watering ponds or tanks, identified cliff, canyon, and draw habitats; and within 300 yards of birds of prey nest sites.

8. To minimize drift and volatilization, aerial applications of all the herbicides proposed for use would be confined to periods when wind speed is less than seven miles per hour, air temperature is under 85 degrees F., precipitation is not occurring or imminent, and air turbulence would not affect normal spray patterns. Label directions would be followed if they require additional restrictions. Low volatility formulations would be used.

9. Daily measurements of weather conditions would be made by trained personnel at spray sites during application. Additional measurements would be made at any time that a weather change appears to be taking place which could jeopardize safe placement of the spray on the target area.

10. Spray aircraft would normally be required to fly at an airspeed of less than 100 mph and less than 20 feet above the vegetation unless obstructions are encountered. Nozzle size and pressure would be designed to produce droplets with a diameter of 200-500 microns. All aerial nozzles would be equipped with automatic shutoff devices to prevent loss of herbicide along nonspray flight routes. Spray mixtures would contain drift reduction adjuvants where they would be effective.

11. During air operations, a radio network would be maintained which links all parts of the project. Direct radio communications between spray aircraft and ground observers would be established. Reconnaissance flights would be made before spraying begins to orient pilots as to locations of sensitive areas such as agricultural lands which are adjacent to spray targets.

12. All livestock would be removed from treated pastures prior to aerial spraying.

13. Grazing would not be permitted in treated pastures for 16 months following treatment. Applications would be in strict conformity with label instructions. Each applicator would be trained in the correct operation of spray equipment, prevention of plumbing leaks, safe handling and mixing of herbicides, control of application rate, and would be supervised by licensed personnel. Radio communication would be maintained with any vehicle transporting or spraying herbicide.

The overall responsiblity for monitoring environmental impacts of chemical herbicides rests with the Environmental Protection Agency (P.L. 92-516, Sec. 20).

Research on environmental impacts of herbicides to animals, water, soil, and plants is conducted by chemical companies as a prerequisite to registration with the Environmental Protection Agency. Additional research is conducted by federal agencies and universities. The Bureau would keep abreast of these research findings and adjust its proposed herbicide applications as indicated by research results and EPA recommendations.

Vegetative response would be monitored with appropriate photostations and vegetation sampling transects being established prior to treatment. Onsite data evaluating herbicide effectiveness and the resulting secondary succession would be collected to continually improve the brush control process.

The safe use of herbicides includes precautionary measures to prevent accidental spills. The following precautions describe the measures that would be used to reduce the chance of such accidents, and the emergency action which would be required if an accidental spill should occur.

The applicable federal regulations concerning the storage and disposal of herbicides and herbicide containers would be followed. These are described in the Environmental Protection Agency "Regulations for Acceptance and Procedures for Disposal and Storage," Federal Register May 1, 1974, pages 15236 through 15241.

During Transportation:

1. It is essential to prevent damage to containers so that leaks do not develop, care would be exercised so that the containers are not punctured or ruptured, and so that the lids or caps are not loosened.

2. Precautions would be taken in the loading and stacking of herbicide containers on the transporting vehicle to assure that containers are tied down so that they do not fall when the vehicle moves.

3. Open containers would never be transported. Partly empty containers would be securely resealed before transport.

4. After transportation, all herbicide containers would be inspected for damage and leaks, and the vehicle must be carefully examined for contamination.

During Application:

1. Spraying schedules would be arranged so that poor visibility before and shortly after sunrise and sunset would not seriously affect the safety of the pilot.

2. Spraying from a higher altitude would be allowed where steep terrain in the spray area would make it hazardous to spray at the specified contract heights.

3. To eliminate the need to climb in returning for another spray run, the pilot would be allowed to gain sufficient elevation at the lower open end of drainages after a spraying run.

4. The contractor's chief pilot would be allowed to establish a pattern to avoid danger of collision when pilots spray adjoining blocks concurrently.

5. The pilot would be instructed to stop spraying when, in his own judgment, conditions are too hazardous.

6. The pilot would be instructed to fly at a height above the ground that would produce effective treatment results. In no case should the minimum flight height be less than five feet.

7. Pilots would be cautioned about dangers such as topographic features and location of downdrafts. Project maps would be reviewed with each pilot, paying particular attention to landing strips, areas being sprayed, and approaches to and from those areas.

8. Pilots would be cautioned as to the location of telephone and electric lines near any landing strip which would be used. Telephone and electric lines would be marked with highly visible material if it can be done safely.

9. If an aircraft crashes, the pilot's clothing would be checked to see if he has been splashed with herbicide. If so, and if he is not seriously injured, he would be washed several times with soap.

10. Should a pilot be injured and taken to a hospital or doctor, they would be informed that the pilot has been exposed to a herbicide and would be provided any herbicide label information that is available.

Tanker Precautions:

1. All valves capable of emptying the tanker would be lockable.

2. An air gap or reservoir between the water source and the mixing tank would be required. A separate portable pump may be used.

3. Spray solutions would be mixed away from streams, drains, or ditches leading to streams where spills could reach a stream if they occurred.

4. The movement of loaded herbicide tankers would be planned to minimize travel adjacent to streams.

If Spills Occur:

In the event of a spill, the project inspector or crew foreman would immediately implement measures to contain the herbicide. The following individuals would be notified as soon as possible: 1. the area manager, 2. the district manager, 3. the State Office herbicide-use coordinator, and 4. the New Mexico Department of Agriculture, herbicide regulation division.

1. Herbicides would be contained by diking and collecting pools. The location and availability of earthmoving equipment close to the project would be noted.

2. The Environmental Protection Agency would be notified immediately if a major spill should occur.

3. The surrounding area would be inspected for contamination.

Criteria used in the selection of herbicides are based on guidelines and policies issued by the Department of Interior. These criteria are briefly outlined in the following discussion.

1. The chemical proposed for use is not prohibited by the Department of Interior.

2. Chemicals on the Department of Interior restricted list are only used when:

   a. Nonchemical techniques have been considered and found inadequate.

   b. Use can be limited to a relatively small scale application.

3. Use of any chemical is aimed at a specific brush problem and involves both minimum strength and frequency of application.

4. Chemical herbicides would not be used alone when nonchemical or integrated chemical and nonchemical techiques offer an environmentally feasible alternative.

5. No herbicide would be used when there is evidence to show that:

   a. Water quality would be degraded.

   b. Hazards exist that would unnecessarily threaten fish, wildlife, their food chain, or other components of the natural environment.

6. Herbicides proposed for use must be registered by the Environmental Protection Agency (EPA) according to Public Law 92-516. This law requires a determination by EPA that the chemical "will perform its intended function without unreasonable adverse effects on the environment." If registration of any herbicide is revoked or modified for rangeland use by the Environmental Protection Agency, use of that herbicide by the Bureau will be terminated or modified accordingly.

APPENDIX E-7

IMPLEMENTATION SCHEDULE FOR RANGELAND IMPROVEMENTS AND VEGETATION TREATMENTS[a/]

Priority 1 1982-1983	Priority 2 1984-1987	Priority 3 1988-1991	
3032	3001	2001	6039
3031	3002	2002	6046
5002	3003	3008	6050
5003	3016	3010	6054
5013	3020	3011	6056
6043	3023	3012	6059
6080	3033	3014	6067
6082	3038	3015	6068
6146	3044	3027	6069
	3046	3028	6070
	3052	3034	6072
	5001	3036	6075
	5004	3040	6081
	6001	3043	6083
	6002	3047	6091
	6007	3048	6093
	6016	6010	6094
	6017	6019	6102
	6020	6023	6108
	6022	6026	6109
	6033	6027	6113
	6041	6035	6140
	6042	6037	
	6048		
	6049		
	6053		
	6062		
	6085		
	6145		

Source: BLM Las Cruces District Office EIS Team Files, 1980.

Notes: [a/] Applies to all alternatives, except No Action and Elimination of Livestock Grazing.

APPENDIX F
WATER RESOURCES

APPENDIX F-1

WATER QUALITY CRITERIA FOR IRRIGATION USE

Parameter	Recommended Upper Limit
Salinity	TDS of less than 1,000 mg/l or less suitable for many crops
	TDS of 2,000 mg/l or more not suitable for most crops
	TDS of 2,000 to 5,000 mg/l useful only for tolerant plants on permeable soils with careful management
Sodium	Sodium absorption rations (SAR) greater than 4 can be detrimental to sodium-sensitive crops
	SAR values of 8 to 18 generally acceptable for most crops
Chloride	700 mg/l or less acceptable for many crops
	100 mg/l harmful to certain fruit plants
	TDS effects normally deter crop growth before chlorides reach detrimental levels
Fluoride	1.0 mg/l or less suitable for continuous use on all soils
Sulfate	600 mg/l or less are acceptable for most crops
	1,000 mg/l or more are unsuitable for most crops
Arsenic	0.10 mg/l or less suitable for continuous use on all soils
Boron	0.75 mg/l or less suitable for continuous use on sensitive crops on all soils
	1.0 mg/l or less suitable for semitolerant crops
	2.0 mg/l or less suitable for tolerant crops

Source: Federal Water Pollution Administration, 1968

National Academy of Sciences and National Academy of Engineering, 1972

RECOMMENDED WATER QUALITY CRITERIA FOR LIVESTOCK AND WILDLIFE USE

Parameter	Recommended Upper Limit
Salinity	TDS of less than 3,000 mg/l very satisfactory for all livestock and poultry
	TDS between 5,000 to 7,000 mg/l suitable for cattle, sheep, swine, and horses, but not for lactating animals or poultry
	TDS above 10,000 mg/l not recommended for use
Chloride	1,500 mg/l or less suitable for all livestock and poultry
Fluoride	2.0 mg/l or less suitable for all livestock and poultry
Sulfate	1,000 mg/l or less suitable for most livestock
	2,000 mg/l and above can be detrimental to cattle
Nitrate	100 mg/l or less suitable for livestock and poultry
Arsenic	0.2 mg/l or less suitable for livestock and poultry
Boron	5 mg/l or less suitable for livestock and poultry
Cadmium	0.05 mg/l or less suitable for livestock and poultry
Lead	0.1 mg/l or less suitable for livestock and poultry
Mercury	0.01 mg/l or less suitable for livestock and poultry
Selenium	0.05 mg/l or less suitable for livestock and poultry

Source: Federal Water Pollution Control Administration, 1968

National Academy of Sciences and National Academy of Engineering, 1972

DRINKING WATER STANDARDS

Parameter	Recommended Upper Limit
Arsenic	0.05 mg/l
Barium	1.0 mg/l
Cadmium	0.01 mg/l
Chromium	0.05 mg/l
Lead	0.05 mg/l
Mercury	0.002 mg/l
Nitrate as N	10.0 mg/l
Selenium	0.01 mg/l
Fluoride	12°C and below - 2.4 mg/l
	12.1 to 14.6°C - 2.2 mg/l
	14.7 to 17.6°C - 2.0 mg/l
	17.7 to 21.4°C - 1.8 mg/l
	21.5 to 26.2°C - 1.6 mg/l
	26.3 to 32.5°C - 1.4 mg/l
Silver	0.05 mg/l
Chloride	250 mg/l
Sulfate	250 mg/l
Total Coliform	4 colonies per 100 ml
Radium 226 and 228	5 pCi/l
Gross alpha	15 pCi/l

Source: Primary Drinking Water Standards

Safe Drinking Water Act of 1976 as Amended

STATE WATER QUALITY STANDARDS FOR RUNOFF FLOWING INTO THE RIO GRANDE ABOVE ELEPHANT BUTTE AND CABALLO DAMS

Parameter	State Standard
pH	6.0 to 9.0
Temperature	<32.2°C (90°F)
Fecal coliform	<1000/100 ml
Total dissolved solids	<1500 mg/l
Sulfate	<500 mg/l
Chloride	<250 mg/l

STATE WATER QUALITY STANDARDS FOR RUNOFF FLOWING INTO THE RIO GRANDE FROM 1-MILE BELOW PERCHA DAM DOWNSTREAM TO PLANNING AREA BOUNDARY

Parameter	State Standard
pH	6.6 to 8.8
Temperature	<34°C (93.2°F)
Fecal coliforms	<1000/100 ml
Total dissolved solids	<2000 mg/l
Sulfate	<500 mg/l
Chlorides	<400 mg/l

STATE WATER QUALITY STANDARDS FOR RUNOFF FLOWING INTO THE RIO GRANDE BETWEEN ELEPHANT BUTTE AND CABALLO DAMS

Parameter	State Standard
pH	6.6 to 8.8
Temperature	$<25^oC$ (77^oF)
Fecal coliforms	<1000/100 ml

STATE WATER QUALITY STANDARDS FOR RUNOFF FLOWING INTO RIO GRANDE FROM CABALLO DAM DOWNSTREAM TO 1-MILE BELOW PERCHA DAM

Parameter	State Standard
pH	6.0 to 9.0
Temperature	$<37.2^oC$ (90^oF)
Fecal Coliforms	<100/100 ml

Source: New Mexico Health and Social Services Department, 1977

STANDARDS FOR GROUNDWATER OF 10,000 MG/L TOTAL DISSOLVED SOLIDS CONCENTRATION OR LESS

Water Contaminant	Standard
Human Health Standards	
Arsenic (As)	0.1 mg/l
Barium (Ba)	1.0 mg/l
Cadmium (Cd)	0.01 mg/l
Chromium (Cr)	0.05 mg/l
Cyanide (Cn)	0.2 mg/l
Fluoride (F)	1.6 mg/l
Lead (Pb)	0.05 mg/l
Total Mercury (Hg)	0.002 mg/l
Nitrate (NO_3 as N)	10.0 mg/l
Selenium (Se)	0.05 mg/l
Silver (Ag)	0.05 mg/l
Uranium (U)	5.0 mg/l
Other Standards for Domestic Water Supply	
Chloride (CL)	250. mg/l
Copper (Cu)	1.0 mg/l
Iron (Fe)	1.0 mg/l
Manganese (Mn)	0.2 mg/l
Phenols	0.005 mg/l
Sulfate (SO_4)	600. mg/l
Total Dissolved Solids (TDS)	1000. mg/l
Zinc (Zn)	10.0 mg/l
pH	between 6 and 9

Source: New Mexico Water Quality Control Commission Regulations, Amended, Section 3-103

APPENDIX G
VISUAL RESOURCES

APPENDIX G

VISUAL RESOURCES

The BLM's Visual Resource Management (VRM) program functions in two ways. First, all public land is inventoried and the visual resources evaluated. The end result of this inventory/evaluation is the identification of VRM classes.

Second, the program provides the framework for evaluation of proposed projects relative to their anticipated impact on the visual resource. The contrast rating system is used to make this evaluation.

Inventory Evaluation

Evaluation of the scenic quality of a landscape, the visual sensitivity of that landscape to change, and the distance of the landscape from a viewer determines the final VRM class. A discussion of each aspect of this evaluation follows.

Scenic Quality

Perhaps scenic quality is best described as the overall impression one retains after driving through or walking through an area. During the inventory, an area is divided into units which are primarily homogeneous in terms of landforms, vegetation and structures. Each of these units are then evaluated in terms of seven key factors (landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications). Rating scores are assigned to each factor according to uniform criteria. The sum of the rating scores are translated into three scenic quality classes: A, B, or C.

Visual Sensitivity

Sensitivity of the landscape is measured in terms of the degree of concern expressed by the public toward scenic quality. A matrix combines user attitude and use volume to an overall rating of high, medium or low sensitivity.

Distance Zones

Distance zones are determined in the field by traveling along each major route and observing the area that can be viewed. The areas are defined as the foreground/middle ground, background, or seldom seen.

Management Classes

Visual Resource Management Classes describe the different degree of modification allowed in the basic elements of the landscape. These classes are determined through a matrix which combines scenic quality, visual sensitivity and distance zones. The resulting classes are mapped and become the basis used to assess the impact of proposed activities. Map 2-7 illustrates the final classes and describes the degree of modification allowed in each class.

Contrast Rating System

The degree to which a proposed project affects the visual quality of the landscape depends on the amount of visual contrast that is created between the activity and the existing landscape. The contrast rating system is used to assess this contrast.

The system reduces a landscape to its major features (land and water, vegetation, structures) and each feature into its basic elements (form, line, color, texture). The predicted contrast of the proposal against each landscape feature then indicates the total anticipated visual impact.

For each management class, there are maximum acceptable ratings for each element and any one feature.

Conclusion

Using this system, the predicted impacts of each proposal are anticipated and extreme visual contrasts are mitigated during the planning and design stage.

For a more thorough discussion of the Visual Resource Management procedures, see BLM Manual, sections 8411 and 8431.

APPENDIX H
CULTURAL RESOURCES

IN REPLY REFER TO
8100
X1742

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

District Office
P. O. Box 1420
Las Cruces, New Mexico
88001

February 23, 1981

Mr. Thomas Merlan
New Mexico State Historic Preservation Officer
505 Don Gasper Avenue
Santa Fe, NM 87503

Dear Mr. Merlan:

We are in the process of preparing an Environmental Impact Statement on the Southern Rio Grande Planning Area which encompasses 2,146,034 acres of public land. The proposed action involves 198 grazing allotments with numerous rangeland improvements. There would be a decrease in livestock numbers over the short-term and a slight increase in existing numbers in the long-term. Other alternatives being considered include no action, elimination of livestock grazing, maximization of forage production, enhancement of other resource values, and the five year average, which is very similar to the proposed action.

In mitigating the watering facilities, the BLM proposes to survey 40 acres around each one to determine if any sites are in the area of heavy trampling. All other surface disturbing activities such as wells, fences, and pipelines would receive a Class III survey. In all cases the project would be relocated if a site is located or the 106 consultation process would be initiated. Based on a series of responses we have received from C 14 laboratories, we do not believe that any impacts occur to archaeological sites from chemical vegetative control, therefore, no Class II surveys will be performed prior to treatment.

Currently the Southern Rio Grande Planning Area does not have a Class II survey. In our latest program packaging, our district has requested funds for a Class II sample for the Las Cruces-Lordsburg resource area and the White Sands resource area. These surveys would cover 292,400 acres and 226,900 acres respectively, if they are funded. This would give the Las Cruces District Class II coverage of all its lands. In light of the Programmatic Memorandum of Agreement covering the livestock grazing program, the above Class II surveys will meet the requirements of stipulation 1.a. assuming that they are funded.

We are looking forward to your comments required by the MOA regarding our proposed mitigating measures for surface disturbing activities as well as our proposal for meeting stipulation 1.a.

of the MOA. If these surveys are not funded I would like your comments regarding what measures we can take to meet the inventory requirements. We need your response, agreeing or disagreeing with some or all of our proposed mitigating measures, by March 20th for inclusion in the draft EIS. Hopefully, we will be able to avoid the problems we had on the McGregor EIS by close coordination with your office and the Advisory Council for Historic Preservation.

Sincerely yours,

Daniel C. B. Rathbun

Daniel C. B. Rathbun
District Manager

Enclosures

1912

STATE OF NEW MEXICO

DEPARTMENT OF
FINANCE AND ADMINISTRATION

STATE PLANNING DIVISION

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ANITA HISENBERG
DIRECTOR

JOE GUILLEN
DEPUTY DIRECTOR

April 17, 1981

Mr. Daniel C. B. Rathbun
District Manager
Las Cruces District
Bureau of Land Management
Post Office Box 1420
Las Cruces, New Mexico 88001

Attn: Mr. Ed Webb

Dear Mr. Rathbun:

As you have requested, I have reviewed your draft Environmental Impact Statement for the Southern Rio Grande Planning Area as provided for in the Programmatic Memorandum of Agreement for Livestock Grazing and Range Improvement Programs. My comments are directed to the adequacy of the cultural resource information presented for meeting the requirements of this Agreement and deal primarily with the Proposed Action.

The requirement for preparing Class I overview and existing inventory statements for the Southern Rio Grande Area has been met with the completion of the work by LeBlanc and Whalen available in draft form. However, as you have pointed out, the requirement for Class II sample surveys has not been met, only 1% of the area having been covered by archaeological surveys. The proposal, outlined in your subsequent correspondence, to seek funding for two sample surveys in Las Cruces-Lordsburg and White Sands resource areas would, if completed, provide sufficient coverage to meet the Class II requirement.

Without adequate Class II coverage, it is my opinion that evaluation of the results of your Class III surveys of facilities development will be difficult at best, without a more complete understanding of the resource on a regional basis. The result would be that many resources located by project- specific surveys will be determined to be significant when in fact the information which could be gained from a specific site may not be considered important when viewed with a better understanding of its regional context. With the possibility of more sites being determined eligible for inclusion in the National Register, more effort will be required either to avoid sites or to mitigate adverse effects of range improvement projects.

In addition to not knowing the relative value of individual sites, not knowing where sites are likely to be located (and in what densities) could further compound cultural resource management responsibilities. Being able to select locations for range improvement projects to avoid areas where the likelihood of a high frequency of significant cultural resources is predicted or known would be an additional, if not the most important, advantage to completing the required Class II sample surveys before selecting the range management alternative to be implemented.

The Programmatic Memorandum of Agreement provides for agreement to an acceptable alternative if, for funding or other reasons, you are unable to conduct Class II surveys. I do not have any suggestions for an alternative which would approximate the management value of well designed Class II studies, but would of course be willing to discuss such alternatives with you and the district archaeologist should it be necessary. I believe the problems encountered with the McGregor EIS can be best avoided by timely completion of the two surveys or agreement on alternatives for inclusion in the environmental statement.

Your proposal to continue the program of conducting Class III surveys in advance of range improvement projects and to consult with this office in accordance with 36 CFR 800 procedures complies with the provisions of the Memorandum. I am pleased with your proposal to survey 40 acre plots around watering facilities recognized as areas subject to heavy cattle trampling. With regard to the question of what effect herbicides may have on C-14 dating of archaeological resources, the statement from the University of California at Riverside is inconclusive in deciding this matter. I believe Dr. R. E. Taylor's suggestion to conduct a testing program to study the effects of herbicides on C-14 dating is well taken, and I would further suggest that such a test is something to consider in conjunction wiht the Class II surveys.

In concluding my comments, I wish again to stress the need for the Class II sample surveys or appropriate alternatives for the Southern Rio Grande Planning Area. Without the data developed by these investigations, it is not possible to address the impacts that the various alternatives presented in the Environmental Statement may have on cultural resources. Furthermore, it is not possible adequately to understand what the impacts on cultural resources may be when making management decisions for implementation of the selected alternative.

Sincerely,

Thomas W. Merlan

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau

TWM:DER:jmg

Note on letter from SHPO to BLM dated December 19, 1979:

The bulk of this letter refers to the McGregor EIS. The section of this letter dealing with the Southern Rio Grande EIS is contained in paragraphs 3, 4, 5, and 6 on the second page of the letter.

1912

STATE OF NEW MEXICO

DEPARTMENT OF
FINANCE AND ADMINISTRATION
PLANNING DIVISION

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December 19, 1979

Mr. Daniel C. B. Rathbun
Bureau of Land Management
Las Cruces District
P. O. Box 1420
Las Cruces, New Mexico 88001

Dear Mr. Rathbun:

This is to note the results of a consultation between me and Mr. Peter Laudeman and Ms. Candace Ojala of your staff on December 17, 1979, regarding the eligibility to the National Register of Historic Places of certain archeological and historical sites on Bureau lands on McGregor Range, Fort Bliss.

We determined that sufficient information was not available to make possible a determination of the eligibility or ineligibility of the following sites: 77-030-267, 541, 373, 380, 440, 275, 191, 255, 488, 2728, 423, 885, 887, 2576, 143, 523, 578, 597, 746, 712, 715, 716, 750, 776, 2695.

We also determined that the following sites did not meet any criteria of National Register eligibility: 439, 493, 704, 718, 719, 742, 743, 744, 634, 639, 651, 653, 825, 837, 848, 853, 371, 372, 836, 606, 608, 616, 839, 842, 2729, 2730, 2731, 2733, 473, 478, 786, 492, 495, 497, 498, 499, 505, 508, 509, 581, 584, 2741, 2762, 579, 580, 583, 586, 428, 430, 431, 436, 459, 461, 463, 465, 467, 411, 412, 876, 441, 826, 827, 877, 879, 514, 533, 577, 587, 856, 871, 740, 684, 685, 686, 690, 696, 701, 705, 707, 708, 711, 729, 731, 735, 772, 780, 2288, 2648, 2658, 402, 404, 405, 406, 600.

We further determined that the following sites had yielded and were likely to yield significant information regarding the prehistory of the region: 186, 198, 200, 262, 263, 264, 771, 781, 782, 785, 861, 862, 870, 888, 889, 1485, 374, 494, 539, 675, 678, 679, 680, 694, 700, 703, 720, 721, 722, 734, 741, 857, 627, 631, 632, 636, 637, 638, 643, 644, 645, 646, 649, 654, 655, 658, 659, 660, 661, 662, 663, 664, 665, 668, 669, 670, 821, 822, 823, 824, 847, 1093, 522, 528, 529, 2292, 554, 375, 377, 378, 379, 535, 399, 469, 830, 831, 832, 833, 834, 835, 588, 589, 607, 609, 614, 615, 617, 618, 624, 625, 626, 647, 648, 650, 666, 667, 838, 840, 841, 843, 844, 845, 854, 855, 519, 527, 532, 2732, 474, 475, 479, 480, 481, 482, 483, 484, 485, 487, 489, 490, 491, 496, 506, 507, 582, 585, 2742, 2763, 424, 425, 426, 427, 432, 464, 610, 620, 630, 850, 858, 409, 410, 199, 536, 537, 1833, 828, 829, 846, 849, 872, 873, 874, 878, 880, 881, 882, 884, 886, 515, 540, 1498, 521, 524, 530, 531, 534, 477, 504, 513, 501, 747, 478, 859, 865, 867, 868, 257, 266, 682, 683, 687, 689, 692, 693, 695, 697, 698, 699, 702, 706, 709, 710, 713, 714, 717, 723, 724, 725, 726, 727, 730, 732, 749, 751, 752, 773, 774, 7777, 778, 779, 784, 2287, 516, 517, 518, 520, 2693, 2694, 2696, 393, 394, 395, 396, 403, 407, 590, 591, 595, 596.

We also found that sites 549, 551 and 550 embody the distinctive characteristics of types of construction, as well as being likely to yield significant historical information.

Consensus determinations of site eligibility are subject to review by the Keeper of the National Register, as set forth in 36 CFR 63.

In the same meeting, we also discussed the question of how to analyze a number of site forms in order to incorporate appropriate archaeological and historical information into a Unit Resource Analysis. The site forms were written over a period of almost fifty years and vary greatly in quality and content. It was my conclusion that most of them do not contain information sufficient to permit the National Register eligibility or significance of the sites to be determined. Some sites were well documented, but these were in a small minority.

The Class I document ("An Archeological Synthesis of South Central and Southwestern New Mexico" by LeBlanc and Whalen, 1979) deals with the presently available information.

The information necessary to a meaningful discussion in a Unit Resource Analysis can only be obtained through a stratified random sample or samples of the area in question.

Until such a sample is obtained, our best procedure is to continue to consult on survey reports covering areas of direct effect.

Thank you for your continuing cooperation.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau

TWM:lm

cc: Glen DeGarmo

APPENDIX I
RECREATION

APPENDIX I

METHODOLOGY FOR DETERMINING HUNTER VISITOR DAYS

Current deer hunting visitor days are projected by using the following method:

Deer hunter days per deer harvest is multipled by the projected deer harvest. This results in the projected hunter days for all lands within a deer herd unit. The percent of hunter pressure on public land and the percent of SRGPA public land within the deer herd unit are then multiplied by the projected hunter days. The resulting figure is the projected hunter days attributable to the public land in the SRGPA. Hunter days are calender days spent hunting. A visitor day is participation in a recreation activity by one or more individuals aggregating a total of 12 hours of use. A deer hunting day is estimated to be 1.5 visitor days. To project visitor days attributable to the BLM which occur in the SRGPA the projected hunter days are multiplied by 1.5. The chart, Current Deer Hunting Visitor Days, contains the figures used in this analysis.

CURRENT DEER HUNTING VISITOR DAYS

SOUTHERN RIO GRANDE PLANNING AREA (SRGPA)

eer Herd Unit	Hunter Days[a/]&[d/] Per Deer Harvest	Projected[a/] Deer Harvest	Projected Hunter Days	Acres of[b/] All Public Land Within Deer Herd Unit	Percent of[b/] Hunter Pressure on Public Land	Acres of[c/] SRGPA Public Land Within Deer Herd Unit	Percent of SRGPA Public Land Within Deer Herd Unit	Projected[d/] Hunter Days Attributable to SRGPA Public Land	Projected[d/] Visitor Days Attributable to SRGPA Public Land
hite Sands (WHSD)	4.20	733	3,078	340,756	38%	172,480	50.6%	592	888
eming (DEMG)	23.33	41	957	232,243	80%	24,320	10.5%	80	120
ila (GILA)	15.60	3,182	49,639	551,537	14%	86,080	15.6%	1,084	1,626
agdalena (MAGD)	19.87	497	9,875	483,746	15%	33,440	6.9%	102	153
otal								1,858	2,787

ources and Notes: a/New Mexico Department of Game and Fish, Random Card Survey, 1978.
b/New Mexico Department of Game and Fish, Comprehensive Plan, 1978.
c/Map 2-2 Deer and Pronghorn Herd Units.
d/Hunter days are calender days spent hunting. A visitor day is participation in a recreation activity by one or more individuals aggregating a total of 12 hours of use. A deer hunting day is estimated to be 1.5 visitor days.

Deer hunting visitor days are projected for the various alternatives by using the following method:

At present, 2,787 deer hunting visitor days are occurring on the public land within the SRGPA. These hunters are pursuing a deer population of 1,500. This figure represents the present population of 1,363 deer in the established herd units plus 137 deer which are scattered throughout the Planning Area. Dividing hunting visitor days by the deer population results in 1.858 visitor days for each deer. Assuming this amount of hunting pressure continues, future visitor days are projected by multiplying 1.858 by the projected population.

	Deer Population	Projected Hunter Visitor Days
Proposed Action	3,360	6,243
No Action	1,500	2,787
Elimination of Livestock Grazing	7,113	13,216
Maximization of Livestock Forage Production	3,360	6,243
Enhancement of Other Resource Values	3,360	6,243

Pronghorn hunters are regulated by a permit system. Currently 80 permits are issued for the pronghorn herds located in the SRGPA. Approximately 35 percent of these hunters use public land. The average hunter spends 2.1 visitor days pursuing pronghorns. Approximately 59 visitor days are currently attributed to pronghorn hunting on public land within the SRGPA.

Future pronghorn visitor days are based on projected pronghorn populations. Approximately 30 permits are issued for each 100 pronghorn in a herd. No permits would be issued for herds of less than 100 animals.

Under the Maximization of Livestock Forage Production Alternative, a significant change in pronghorn populations would occur. Approximately 303 permits would be issued for pronghorn hunting. This would result in approximately 636 visitor days on all lands within the SRGPA. Of these, 224 visitor days could be attributed to public land.

GLOSSARY

GLOSSARY

ACRE-FOOT. The amount of water it would take to cover one acre of land to a depth of one foot; 325,851 gallons; 43,560 cubic feet.

ADJUSTMENTS IN NUMBERS. Change (increase or decrease) of livestock numbers to conform to the amount of forage produced in an area considering other multiple uses.

ALLOTMENT. An area of land designated and managed for grazing of livestock.

ALLOTMENT MANAGEMENT PLAN (AMP). A documented program which applies to livestock operations on public land, prepared in consultation with the permittee(s) or lessee(s) involved, and which : (1) prescribes the manner in and extent to which livestock operations will be conducted in order to meet the multiple-use, sustained-yield, economic, and other needs and objectives as determined for the public land through land use planning; and (2) describes the type, location, ownership, and general specifications for the rangeland improvements to be installed and maintained on the public land to meet the livestock grazing and other objectives of land management; and (3) contains such other provisions relating to livestock grazing and other objectives as may be prescribed by the authorized officer consistent with applicable law.

ALLOWABLE USE FACTOR (AUF). Represents the average weight percentage of a particular plant species that can be safely grazed without restricting future forage capacity production.

ALLUVIAL (ALLUVIUM). Soil material deposited on the land by water.

ALLUVIAL FAN. A fan-shaped accumulation of disintegrated soil material; water deposited and located in a position where the water departs from a steep course to enter upon a flat plain or open valley bottom.

ANIMAL UNIT (AU). Considered to be one mature (1,000 lbs.) cow or its equivalent based upon average daily forage consumption of 26 pounds of dry matter per day.

ANIMAL UNIT MONTH (AUM). The amount of food or forage required by an animal-unit for one month.

ANNUAL PLANT. A plant that completes its life cycle and dies in 1 year or less.

BASIN AND RANGE. Topography characterized by a series of tilted fault block mountain ranges and broad intervening basins.

BIOACCUMULATION. The uptake of substances from the environment, other than food. Generally, the uptake of environmental pollutants.

BIOMASS. The total quantity of living organisms of one or more species per unit of space (called species biomass) or of all the species in a community (called community biomass).

BROWSE. (noun) That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption. (verb) To consume browse.

CALCAREOUS. Having sufficient accumulation of calcium carbonate ($CaCO_3$) to produce a pH of over 7.0 and would effervesce visibly when treated with cold dilute hydrochloric acid (HCl).

CALF CROP. The number of calves weaned from a given number of cows bred, usually expressed in percentages.

CALICHE. A layer in the soil, more or less cemented by calcium carbonates ($CaCO_3$), commonly found in arid and semi arid regions.

CAMBIUM. A thin formative layer between the xylem and phloem of most vascular plants that gives rise to new cells and is responsible for secondary growth.

CARBON MONOXIDE. A colorless, tasteless, and odorless gas produced primarily from incomplete combustion of fossil fuels used in vehicles, industries, and space heating.

CARRYING CAPACITY. Maximum stocking rate possible without inducing damage to vegetation or related resources. It may vary from year-to-year on the same area due to fluctuating forage production. (See Grazing Capacity.)

CINDER CONE. A conical hill formed by volcanic activity with the accumulation of cinders and other ejecta.

COARSE TEXTURED SOIL. A soil consisting of mostly large particles. It includes sands, loamy sands, and sandy loams (see Soil Texture).

COLLUVIUM (COLLUVIAL). A deposit of soil material and rock fragments accumulated at the base of steep slopes as a result of gravitational action.

CONTRAST RATINGS. A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature.

COW YEARLONG (CYL). The amount of forage necessary to sustain one cow for a 1-year period. One CYL equals 12 AUMs.

CULTURAL RESOURCE INVENTORY CLASSES.

Class I - Existing data inventory: an inventory study of a defined area designed to provide a narrative overview (cultural resource overview) derived from existing cultural resource information, and to provide a compilation of existing cultural resource site record data on which to base the development of the BLM's site record system.

Class II - Sampling field inventory: a sample-oriented field inventory designed to locate and record from surface and exposed profile indications all cultural resource sites within a portion of a defined area in a manner which will allow an objective estimate of the nature and distribution of cultural resources in the entire defined area. The Class II inventory is a tool utilized in management and planning activities as an accurate predictor of cultural resources in the area of consideration. The primary area of consideration for the implementation of a Class II inventory is a planning unit. The secondary area is a specific project in which an intensive field inventory (Class III) is not practical or necessary.

Class III - Intensive field inventory: an intensive field inventory designed to locate and record from surface and exposed profile indications all cultural resource sites within a specified area. Normally, upon completion of such inventories in an area, no further cultural resource inventory work is needed. A Class III inventory is appropriate on small project areas, all areas to be disturbed, and primary cultural resource areas.

DEFERRED ROTATION GRAZING. Discontinuance of grazing on various parts of a range in succeeding years, allowing each part to rest successively during the growing season to permit seed production, establishment of seedlings, or restoration of plant vigor. At least two, but usually three or more separate units are required. Control is usually ensured by unit fencing, but may be obtained by camp unit herding.

DESIRABLE FORAGE PLANT. Plants which are palatable and productive forage species, often are dominant under climax or near climax conditions, are long-lived, and have deep fibrous roots to protect the watershed against erosion.

DIRECT IMPACT. Income, employment, or population changes for individual economic sectors, such as range livestock production, resulting from permitted grazing level adjustments.

DIVERSITY. The relative degree of abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

DIVERSITY INDEX. A number that indicates the relative degree of diversity in habitat per unit area.

ECOSYSTEM. An interacting natural system including all the component organisms together with the abiotic (non-living) environment.

ENDANGERED SPECIES.

Federally listed - Any species of animal or plant in danger of extinction throughout all or a significant portion of its range.

State (Group I) - Species whose prospect of survival or recruitment in the state are in jeopardy in the foreseeable future.

State (Group II) - Species whose prospect of survival or recruitment within the state may become jeopardized in the foreseeable future.

ENVIRONMENTAL ASSESSMENT (EA). An environmental assessment: (a) means a concise public document for which a Federal agency is responsible that serves to : (1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. (2) Aid an agency's compliance with the National Environmental Protection Agency (NEPA) when no environmental impact statement is necessary. (3) Facilitate preparation of a statement when one is necessary. (b) Shall include brief discussions of the need for the proposal, of alternatives as required by Sec. 102 (2)(E), of the environmental impacts of the proposed action and alternatives and a listing of agencies and persons consulted.

FAULT. A rock fracture along which there has been movement.

FAULT BLOCK. A unit of the earth's crust formed by block faulting; it is bound by faults either completely or in part.

FECAL ANALYSIS. A technique for determining diet by microscopic examination of fecal material.

FINE TEXTURED SOIL. A soil consisting of large quantities of the fine fractions. It includes clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, and clay textural classes (see Soil Texture).

FORAGE ALLOCATION. The amount of or percentage of the total forage produced, which is given for a particular use such as livestock grazing, wildlife, or watershed protection.

FORAGE (COMPETITIVE). Plants which are used as food by large herbivores, such as cattle, and by large and small wildlife.

FORAGE VALUE CLASS. Is based on the percent of desirable forage in the composition for livestock and the existing erosion condition of a site. Condition of the rangeland must include consideration of vegetation quality and quantity and soil erosion characteristics. Present rangeland condition is determined by direct field examination which includes transect and ocular reconnaissance procedures.

Good condition - A rangeland is in good condition if plant composition is 40 percent or more of both desirable and intermediate species with at least 20 percent of the composition made up of desirable species. Species composition is determined by using paced transects and ocular reconnaissance procedures.

Fair condition - A rangeland is in fair condition if the plant composition is 15 to 39 percent of desirable and intermediate species with 5 or more percent made up of desirable species. Also, those ecosystems where the composition comprises 60 percent or more of intermediate species and less than 5 percent desirable species are present will be rated "fair". The actual percent compositions by species are determined by paced transect and ocular reconnaissance procedures.

Poor condition - A rangeland is in poor condition if the plant composition is less than 15 percent desirable and intermediate species.

FORB. Any herbaceous non-woody plant that is not a grass or grass-like plant.

GEOTHERMAL ENERGY. Useful energy that can be extracted from naturally occurring steam, hot water, or hot rock in the earth's crust.

GRAZING CAPACITY. The maximum livestock stocking rate possible without inducing damage to vegetation or related resources such as watershed. This incorporates such things as suitability of the rangeland to grazing as well as the proper use which can be made on all of the plants within the area. Normally expressed in terms of acres per animal unit month (AC/AUM) or sometimes referred to as the total AUMs that are available in any given area such as an allotment. Areas that are unsuitable for livestock use are not computed in the grazing capacity. Grazing capacity may or may not be the same as the stocking rate.

GRAZING PREFERENCE. The total number of animal unit months of livestock grazing on public land apportioned and attached to base property owned or controlled by a permittee or lessee.

GRAZING TREATMENT. Under a grazing system, grazing or resting a particular unit of land (usually a pasture) at particular times each year to attain specific vegetative goals.

HABITAT. An area where a plant or animal lives. (Sum total of environmental conditions in the area.)

HABITAT MANAGEMENT PLAN (HMP). A written and officially approved plan for a specific geographical area of public land which indentifies wildlife habitat and related objectives, establishes the sequence of actions for achieving objectives, and outlines procedures for evaluating accomplishments.

HERD UNIT. Big game habitat within a defined geographical area designated by the New Mexico Department of Game and Fish for management purposes.

HUNTER DAY. Calendar day spent hunting. It is assumed a hunter day equals 1.5 visitor days.

IGNEOUS. One of the three main classes into which all rocks are divided; said of a rock that has solidified from molten material.

INDIRECT (REGIONAL) IMPACT. Income, employment, or population changes at the community or county level resulting from direct impacts to economic sectors such as range livestock production.

INTERMEDIATE FORAGE PLANT. Plants which are of secondary importance in the climax condition. They replace the desirable plants as condition deteriorates and replace the less desirable plants as conditions improve. They may be less palatable to grazing animals or be resistant to grazing use.

INTRUSIVE. Igneous rock formed by the emplacement of molten material in pre-existing rock.

KEY FORAGE SPECIES. Forage species whose use serves as an indicator of the degree of use of associated species.

KIND OF LIVESTOCK. Kinds of domestic livestock grazing on rangeland: cattle, horses, sheep, or goats, or a combination of these. May be broken down to greater detail such as cows with calves, yearlings, steers, ewes, ewes with lambs, etc.

LEAST DESIRABLE FORAGE PLANTS. Plants which are definitely the poorer species in a type of community and consist principally of invaders, noxious, and low-value forage plants.

LONG-TERM. The future point in time when rangeland conditions would have improved sufficiently to satisfy present objectives, approximately the year 2010.

MAJOR LAND RESOURCE AREA (MLRA). Large geographic areas of land characterized by particular patterns of soil, climate, water resources, and land use.

MEDIUM TEXTURED SOIL. Intermediate between fine textured and coarse textured soil. It includes very fine sandy loam, loam, silt loam, and silt. (See Soil Texture)

MELANISTIC. Any darkness of the skin, hair, or eyes resulting from high pigmentation.

METABOLITE. A metabolic waste that is usually more or less toxic to the organism producing it.

METRIC MEASURES.
milligrams per liter (mg/l) = parts per million
milligrams (mg) = mg x 1000 = grams
gram (g) = g x 453.6 = pounds
liter (l) = l x 1.057 = quarts
milimeter (mm) = mm x 25.4 = inches
centimeter (cm) = cm x 2.54 = inches

NET BUSINESS INCOME. Total receipts minus variable costs and fixed costs.

NET CASH INCOME. Total receipts minus only variable costs.

OFF-ROAD VEHICLE (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other terrain.

OPTIMUM NUMBERS (BIG GAME). A reasonable number of supportable animals, under miltiple use, with proper habitat management and improvement.

ORDER 3 LEVEL SURVEY. Soil surveys are of Order 1 (detailed) to Order 5 (very broad). An Order 3 survey is displayed on maps with scales from 1:24,000 to 1:250,000. The soil surveys used as reference for this EIS were approximately 1:63,360 or one inch to the mile.

OWNERSHIP COSTS. Depreciation of equipment, improvements, and livestock as well as excise and property taxes on all three.

PACE POINT TRANSECTS. A method of estimating the vegetative ground cover which occurs on a predetermined transect line.

PALATABILITY. The relish with which a particular plant species or part is consumed by an animal. The palatability of a plant is usually related to its ecological significance as far as succession is concerned. That is, highly palatable plants are usually those which are a desirable species and decrease with increasing grazing pressures. Conversely, a low palatability usually characterizes a species which is least desirable and which increases with increasing grazing pressure.

PARENCHYMA. A tissue of higher plants that consists of thin-walled living photosynthetic or storage cells capable of division even when mature and that makes up much of the substance of leaves and roots, the pulp of fruits, and parts of stems and supporting structures.

PERENNIAL PLANT. A plant that has a life cycle of 3 or more years.

PERIOD OF USE. The times of the year when domestic animals would be allowed to graze on a specific unit of rangeland, as designated by license.

pH. The negative logarithm of the effective hydrogen-ion concentration or hydrogen-ion activity (in gram equivalents per liter) used in expressing both acidity and alkalinity on a scale whose values run from 0 to 14. Seven representing neutrality, numbers less than 7 increasing acidity, and numbers greater than 7 increasing alkalinity.

PHENOLOGY. The study of periodic biological phenomena such as initiation of growth, vegetative state, flowering, seeding, and dormancy, especially in relation to precipitation.

PHLOEM. Connecting tissues in plants which transport nutrients.

PLANNING AREA. A geographic area on which planning documents are written. It may be one or more planning units, the smallest sized planning area. In the case of this EIS, it consists of three planning units.

PLANT COMMUNITY. One or more plant species growing in association on a given location or area.

PREFERENCE. See Grazing Preference.

PROPER USE FACTOR (PUF). Represents the average weight percentage of a particular plant species (in relation to all other species) that can be safely grazed without restricting forage capacity production.

RANCH SIZE CATEGORIES.

Large Commercial-Size Ranch Category - Includes ranch operations with herd sizes of 500 AUs and more.

Medium Commercial-Size Ranch Category - Includes ranch operations with herd sizes of 200-499 AUs.

Small Commercial-Size Ranch Category - Includes ranch operations with herd sizes of 75-199 AUs.

Subsistence-Size Ranch Category - Includes ranch operations with herd sizes of 1-74 AUs.

RANGELAND. Land on which the vegetation is predominantly grasses, grass-like plants, forbs, or shrubs usually suitable for grazing or browsing use.

RANGELAND CONDITION (ECOLOGICAL). The present state of the vegetation on a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site. Rangeland condition is basically an ecological rating of the plant community.

Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax.

Rangeland Condition Class	Percentage of present plant community that is climax for the range site
Excellent	76-100
Good	51-75
Fair	26-50
Poor	0-25

RANGELAND CONDITION TREND. The direction of change in rangeland condition.

RANGELAND IMPROVEMENT. Any activity or program on or relating to rangelands which are designed to improve production of forage, change vegetative composition, control patterns of use, provide water, stabilize soil and water conditions, and provide habitat for livestock or wildlife.

RANGE SITE. A distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. A range site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species that differs from that of other range sites in the kind or proportion of species or total production. (SCS 1976)

RAPTORS. Any predatory bird (such as a falcon, hawk, eagle, or owl) that has feet with sharp talons or claws adapted for seizing prey and a hooked beak for tearing flesh.

REST ROTATION GRAZING SYSTEM. A grazing system providing for systematic and sequential grazing by livestock and resting from livestock use on a rangeland area to provide for the production of livestock while simultaneously maintaining or improving the vegetation and soil fertility.

RHIZOME. A below ground root-like stem, horizontal in position, which produces roots below and sends up shoots developing into a new plant.

RIFT. A rift or rift zone usually refers to a system of fractures (faults) in the earth's crust and the associated valley or depression.

RIPARIAN VEGETATION. Vegetation which occurs in or adjacent to drainage ways or their flood plains.

SEDIMENTARY. Rocks formed by the consolidation of loose sediment that has accumulated in layers. Sedimentary is one of the three main classes into which all rocks are divided.

SHORT-TERM. The time period during which adjustments in permitted grazing levels on public land would be made.

SITE WRITE-UP AREA (SWA). Small delineated geographical unit used as a base for collecting vegetation data. It may consist of an entire range site or portion of a unit. It may contain more than one present or potential plant community where soil-vegetation complexes occur that cannot be delineated.

SOIL PARTICLES (SEPARATES). Mineral particles ranging between specified size limits:

clay	.002 mm diameter
silt	.05 to .002 mm diameter
sand	2.0 to .05 mm
gravels	76.0 mm (3 inches) to 2.0 mm
cobbles	250 mm (10 inches) to 76.0 mm
stones	250 mm (10 inches)

SOIL SERIES. A group of soils having genetic horizons (layers) that, except for texture of the surface layer, have similar characteristics and arrangement in the profile.

SOIL TEXTURE. The relative proportions of sand, silt, and clay in a soil as described by classes of soil texture. Soil textural classes recognized are:

sand
loamy sand
sandy loam
loam
silt loam
silt
sandy clay loam
clay loam
silty clay loam
sandy clay
silty clay
clay

Modifiers placed on textural classes when appropriate are:

gravelly
very gravelly
cobbly
very cobbly
stony
very stony

SPECIAL CONCERN ELEMENT. Plant species considered rare and endangered by the New Mexico State Heritage Program, but not legislatively protected.

STANDARD METROPOLITAN STATISTICAL AREA. A county which contains at least one city of 50,000 inhabitants or more plus as many adjacent counties as are metropolitan in character and are socially integrated with that central city or cities.

STOCKING RATE. The area of land that the operator has allowed to each animal unit for the entire grazable period of the year. May be expressed as a ratio such as AU/section, acres/AU, or acres/AUM.

STOLON. An above ground branch, runner, or prostrate stem which takes root at the tip and eventually develops into a new plant.

STRUCTURAL DIVERSITY (VERTICAL DIVERSITY). The diversity in an area that results from the complexity of the above ground structure of the vegetation, i.e., the more tiers of vegetation or the more diverse the species make up or both, the higher the degree of vertical diversity.

SULFUR DIOXIDE (SO_2). A colorless, nonflammable, odiferous gas with corrosive qualities. High concentrations are found near copper smelters and industries burning fossil fuels containing sulfur.

SUSPENDED PREFERENCE. That portion of a grazing preference which has been suspended and for which active grazing use will not be reauthorized until forage is available and allocated for livestock grazing use on a sustained yield basis.

SVIM. Soil-Vegetative Inventory Method.

THREATENED SPECIES. Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.

THREE-COUNTY AREA. Consists of Dona Ana, Luna, and Sierra counties, forming the basic unit of analysis for determining social and economic impacts within the Planning Area.

TRANSECT. The area on which inventory data is gathered such as along a line, at points along a line, or over an area of a designated width and length.

UNALLOTTED LANDS. Lands which currently are not committed to livestock grazing use.

USABLE FORAGE. That forage which is available for allocation to livestock and wildlife after the proper use factor of the key forage species on a specific range site has been reached.

UTILIZATION. The proportion of a year's forage production that is consumed or destroyed by grazing animals, usually expressed as a percentage.

VEGETATION TREATMENTS. Methods used to control the growth and spread of undesirable vegetation. Control can be by chemical or mechanical means or by fire.

VISITOR DAY. Participation in a recreation activity by one or more individuals aggregating a total of 12 hours of use.

VISUAL CONTRAST. The effect of a difference in the form, line, color, or texture of an area being viewed.

VOLCANIC ROCK. An igneous rock resulting from volcanic action at or near the earth's surface.

WARM-SEASON PLANT. A plant that makes most of its growth during the spring and summer and sets seed in the late summer or early fall. It is normally dormant in winter.

WILDERNESS CHARACTERISTICS. (1) Size - at least 5,000 contiguous roadless acres of public land. (2) Naturalness - the imprint of man's work must be substantially unnoticeable. (3) Either: (a) an outstanding opportunity for solitude, or (b) an outstanding opportunity for a primitive and unconfined type of recreation.

WILDLIFE. Includes all species of mammals, birds, mollusks, crustaceans, amphibians, reptiles, or their progeny or eggs which whether raised in captivity or not are normally found in a wild state. Feral horses and burros are excluded.

WILDLIFE HABITAT AREA (WHA). A specific geographical area which encompasses, at a mimimum, the biological requirements for specific wildlife species having high priority for management.

WORST CASE. As the exact allocation at the end of the monitoring period is not known at this time, the analysis is made assuming 165,500 AUMs would be the maximum foreseeable reduction.

YEARLING. An animal approximately 1 year of age. A short yearling is from 9 to 12 months of age and a long yearling is from 12 to 18 months.

YEARLONG GRAZING. Continuous grazing for a calendar year.

YEARLONG RANGELAND. Rangeland that is or can be grazed yearlong.

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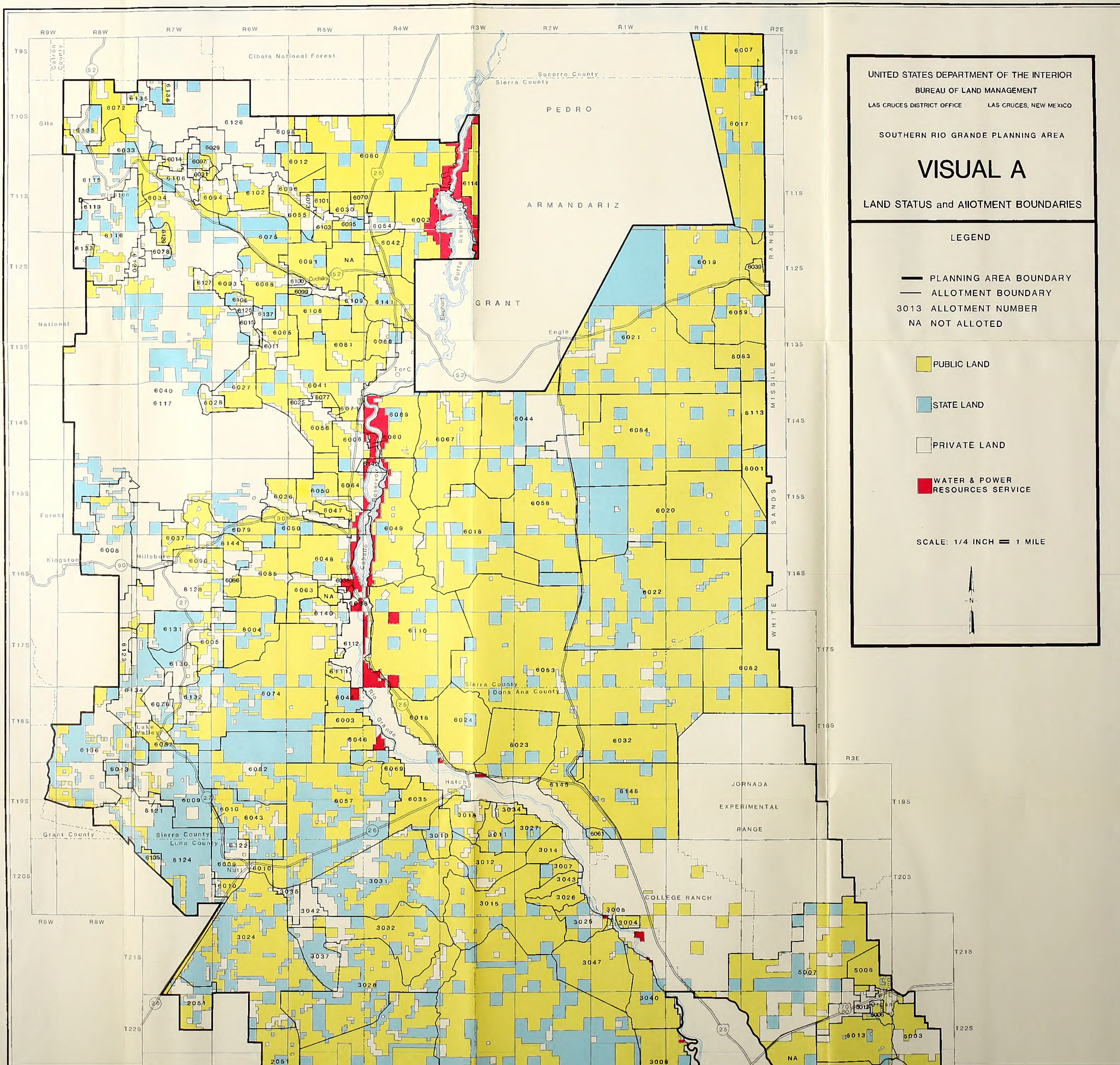


UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT OFFICE LAS CRUCES, NEW MEXICO

SOUTHERN RIO GRANDE PLANNING AREA

VISUAL A

LAND STATUS and AllOTMENT BOUNDARIES

LEGEND

━ PLANNING AREA BOUNDARY
― ALLOTMENT BOUNDARY
3013 ALLOTMENT NUMBER
NA NOT ALLOTED

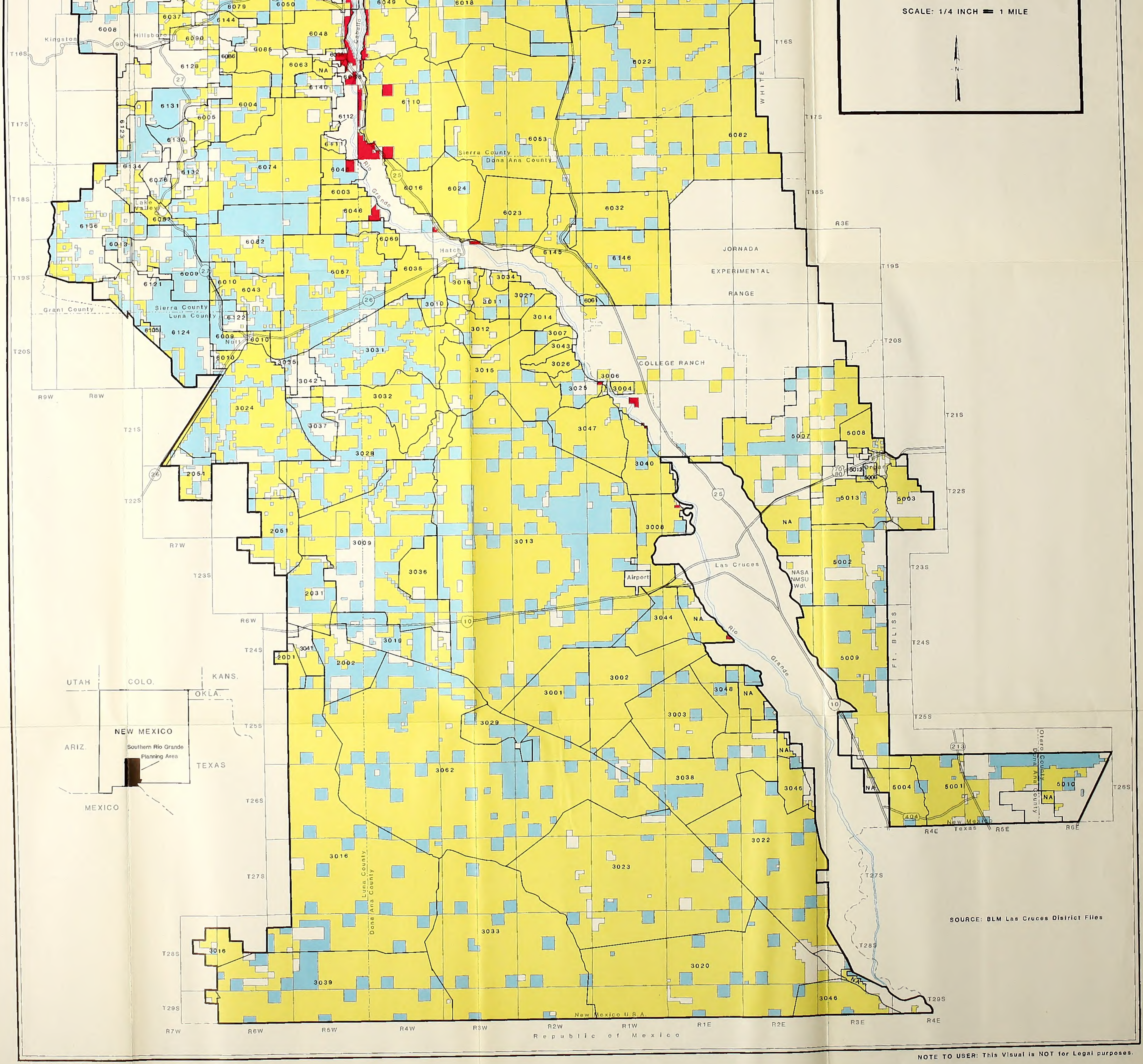
🟨 PUBLIC LAND

🟦 STATE LAND

⬜ PRIVATE LAND

🟥 WATER & POWER RESOURCES SERVICE

SCALE: 1/4 INCH ═ 1 MILE



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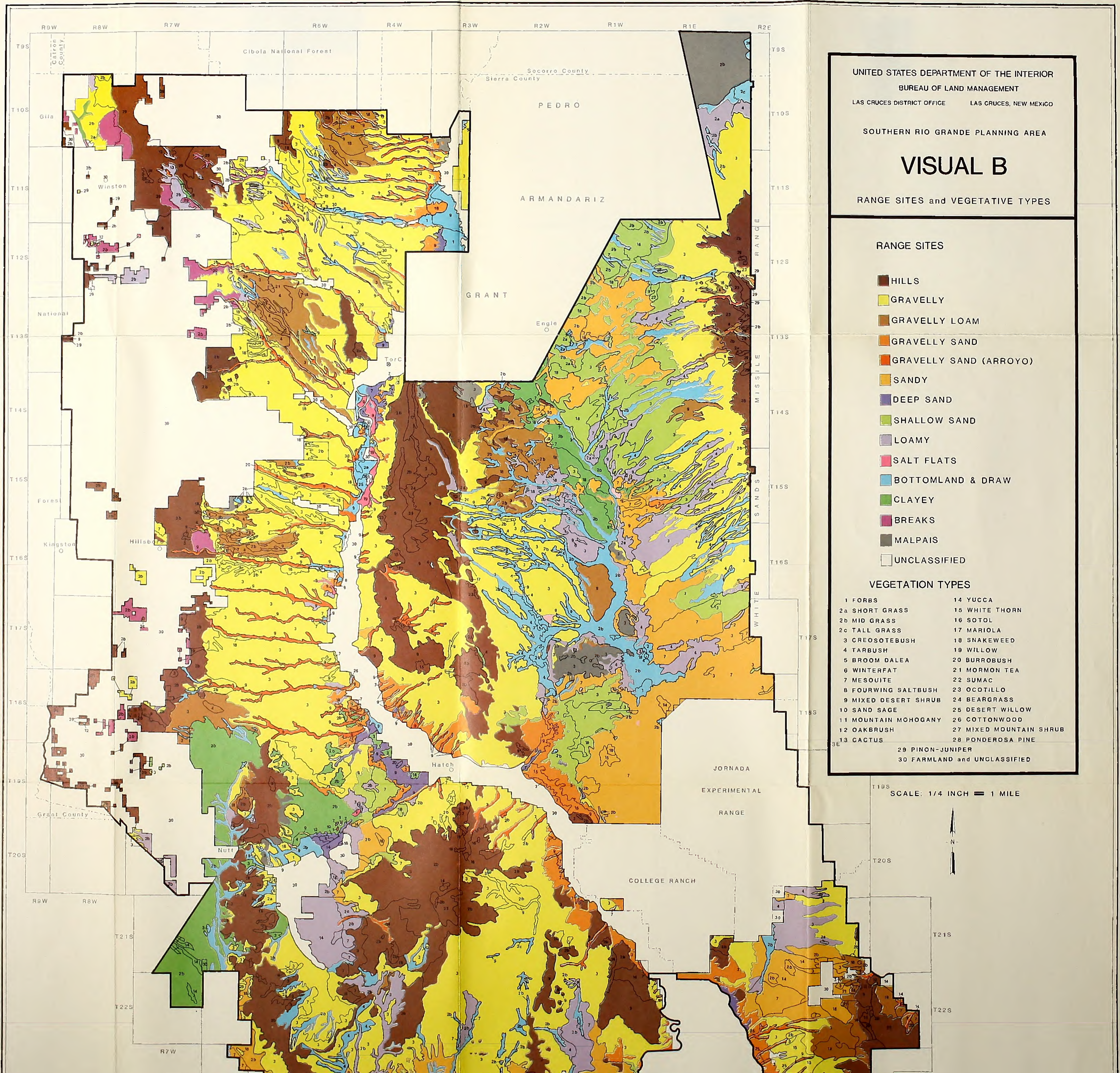


UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT OFFICE   LAS CRUCES, NEW MEXICO

SOUTHERN RIO GRANDE PLANNING AREA

VISUAL B

RANGE SITES and VEGETATIVE TYPES

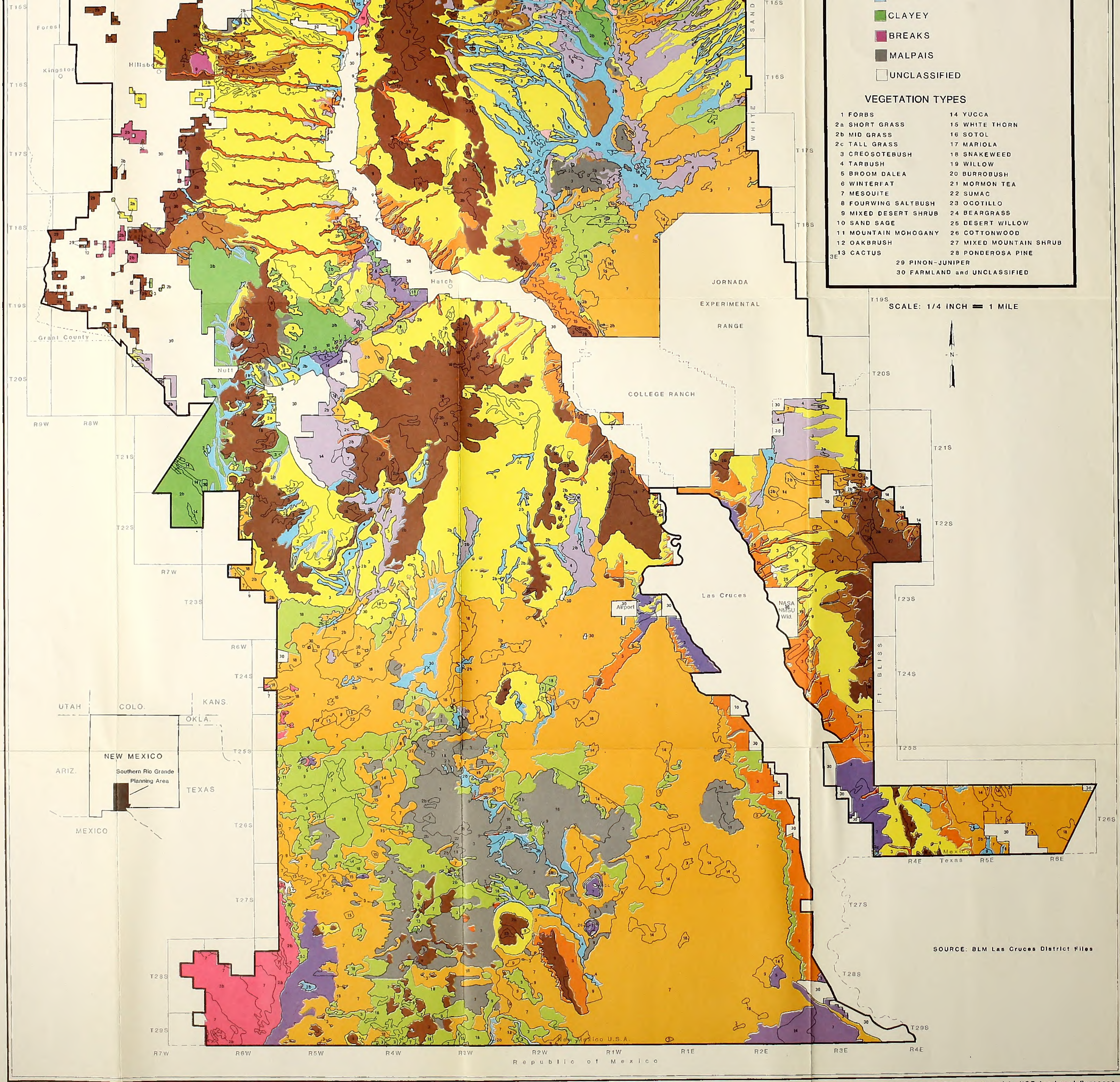
RANGE SITES

- 🟫 HILLS
- 🟨 GRAVELLY
- 🟫 GRAVELLY LOAM
- 🟧 GRAVELLY SAND
- 🟥 GRAVELLY SAND (ARROYO)
- 🟧 SANDY
- 🟪 DEEP SAND
- 🟩 SHALLOW SAND
- 🟪 LOAMY
- 🟥 SALT FLATS
- 🟦 BOTTOMLAND & DRAW
- 🟩 CLAYEY
- 🟪 BREAKS
- ⬛ MALPAIS
- ⬜ UNCLASSIFIED

VEGETATION TYPES

1 FORBS
2a SHORT GRASS
2b MID GRASS
2c TALL GRASS
3 CREOSOTEBUSH
4 TARBUSH
5 BROOM DALEA
6 WINTERFAT
7 MESQUITE
8 FOURWING SALTBUSH
9 MIXED DESERT SHRUB
10 SAND SAGE
11 MOUNTAIN MOHOGANY
12 OAKBRUSH
13 CACTUS
14 YUCCA
15 WHITE THORN
16 SOTOL
17 MARIOLA
18 SNAKEWEED
19 WILLOW
20 BURROBUSH
21 MORMON TEA
22 SUMAC
23 OCOTILLO
24 BEARGRASS
25 DESERT WILLOW
26 COTTONWOOD
27 MIXED MOUNTAIN SHRUB
28 PONDEROSA PINE
29 PINON-JUNIPER
30 FARMLAND and UNCLASSIFIED

SCALE: 1/4 INCH = 1 MILE



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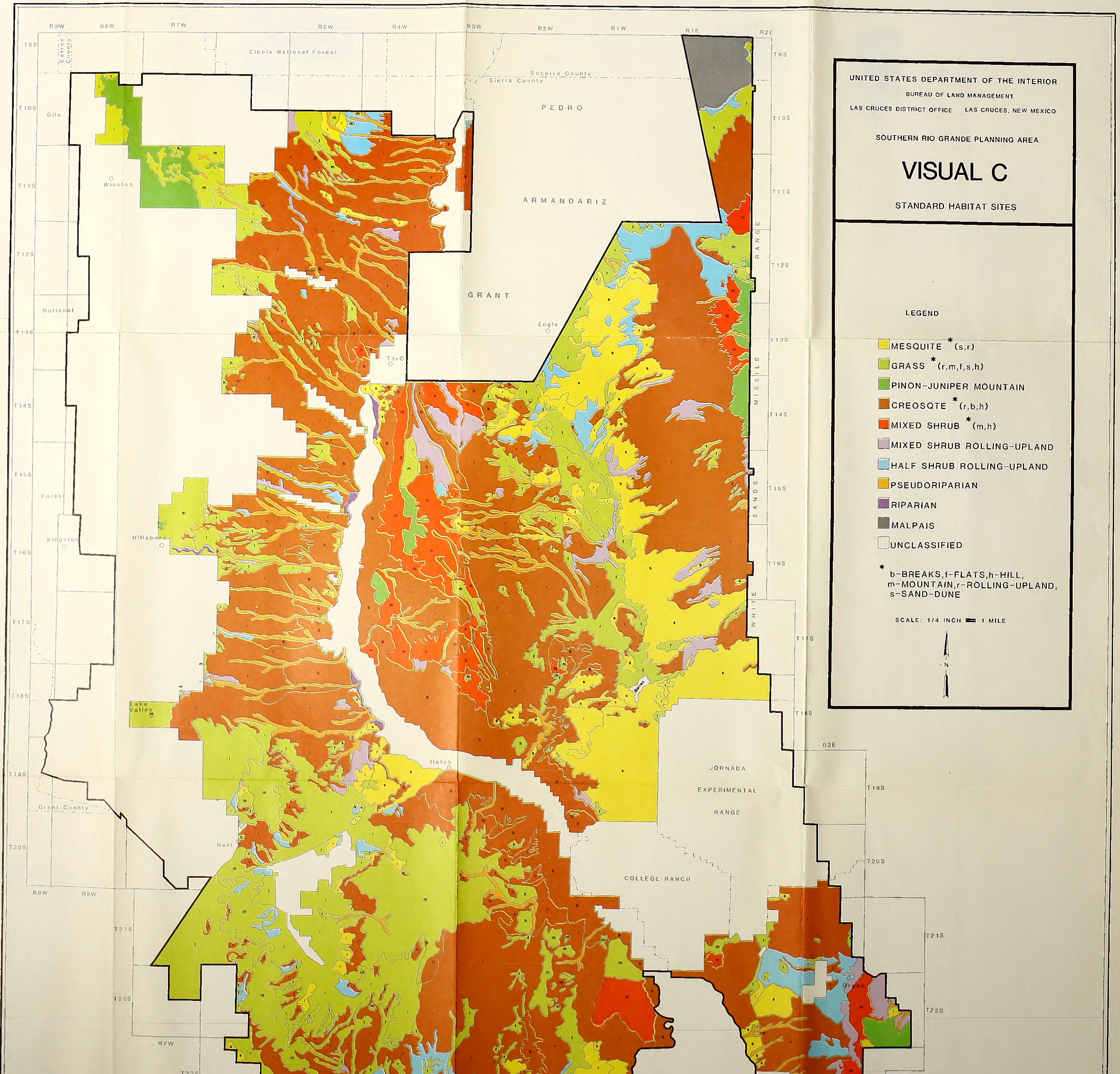


UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT OFFICE LAS CRUCES, NEW MEXICO

SOUTHERN RIO GRANDE PLANNING AREA

VISUAL C

STANDARD HABITAT SITES

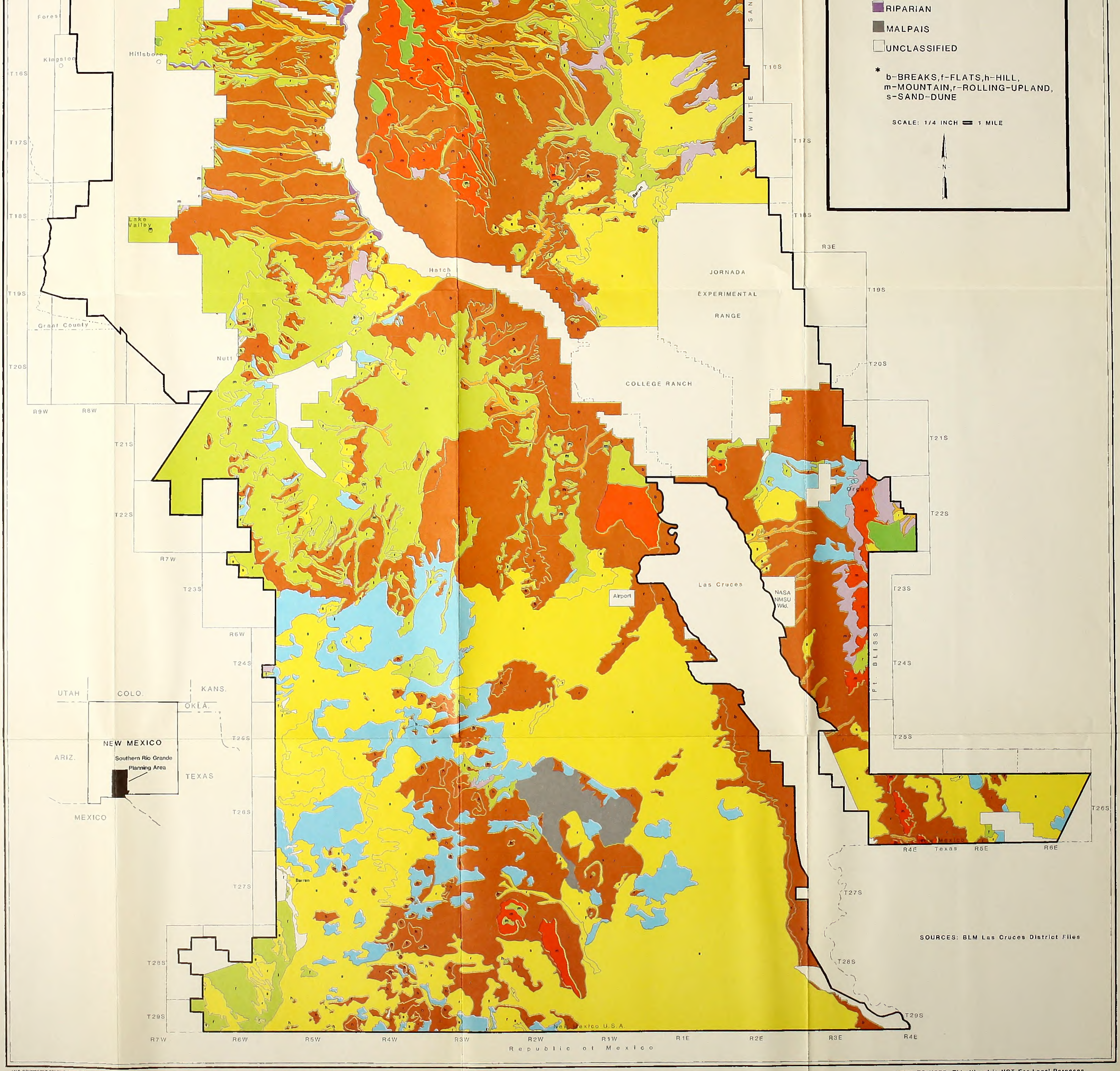
LEGEND

- 🟨 MESQUITE *(s,r)
- 🟩 GRASS *(r,m,f,s,h)
- 🟩 PINON-JUNIPER MOUNTAIN
- 🟫 CREOSQTE *(r,b,h)
- 🟥 MIXED SHRUB *(m,h)
- 🟪 MIXED SHRUB ROLLING-UPLAND
- 🟦 HALF SHRUB ROLLING-UPLAND
- 🟧 PSEUDORIPARIAN
- 🟪 RIPARIAN
- ⬛ MALPAIS
- ⬜ UNCLASSIFIED

* b-BREAKS, f-FLATS, h-HILL, m-MOUNTAIN, r-ROLLING-UPLAND, s-SAND-DUNE

SCALE: 1/4 INCH = 1 MILE

N



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